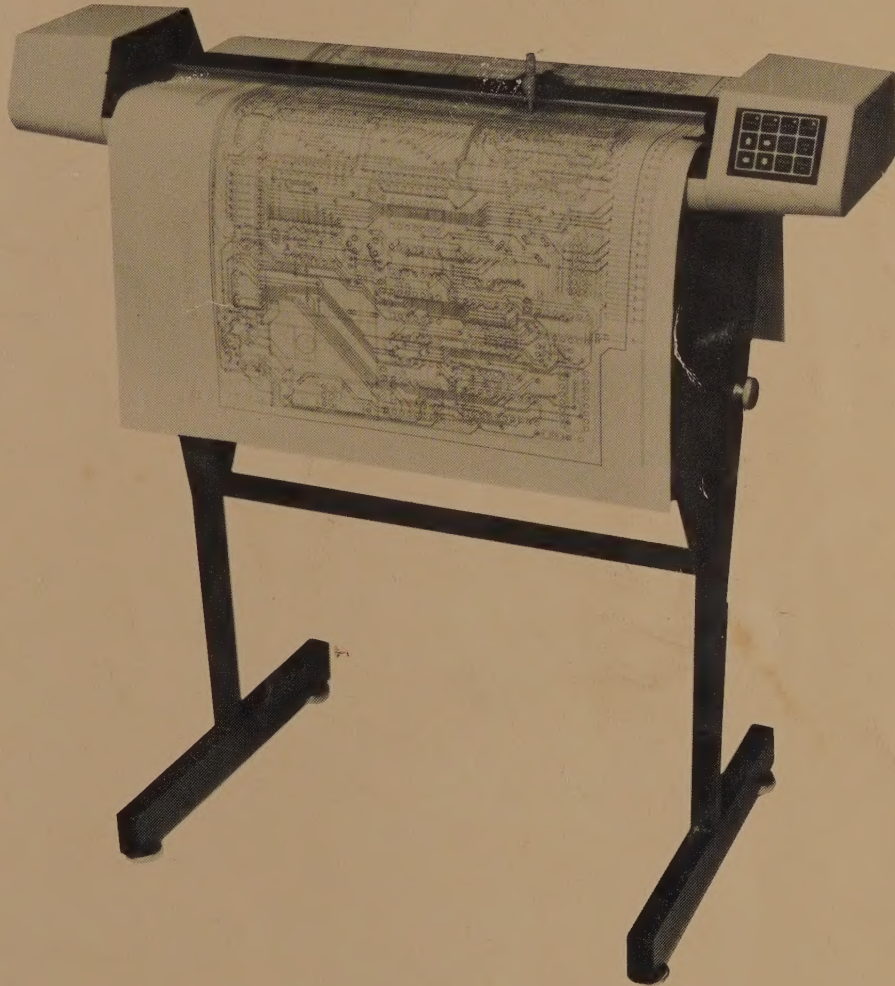


HIPLØT® DMP-41/42

OPERATION MANUAL



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HIPLØT DMP-41 AND 42 PLOTTER

OPERATION MANUAL

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Austin Texas 78753

WARNING

This equipment generates and uses low level frequency energy for timing and control purposes. It can radiate radio frequency energy. If the equipment is not installed and used in accordance with the operator's manual, it could cause interference to radio communications. Sample units have been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J or Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a business, commercial, or industrial environment.

Operation of this equipment in a residential area is likely to cause interference, in which case the user, at their own expense, will be required to take whatever measures may be necessary to correct the interference.

LIMITED WARRANTY

Limited warranty extended to the purchaser is: HIPLØT® products are guaranteed against defects in material and workmanship for a period of 90 days from the date purchased by the customer. Liability under this warranty is limited to repair, adjustment, or replacement under the provisions listed under A and B. Customer shall provide proof of purchase data.

Arrangements for warranty service:

444 3425

1. Contact the Houston Instrument Service Department (toll-free in Texas 1-800-252-8008; toll-free outside of Texas 1-800-624-4786) and request a Return Authorization Number.
2. Write the Return Authorization Number on the outside of the shipping box.
3. Return the equipment to the Houston Instrument Service Department, 8500 Cameron Road, Austin, Texas 78753.

Warranty provisions:

- A. Defective instruments will be returned to Houston Instrument where they will be repaired at no charge to the customer. Houston Instrument will be responsible for the freight charges only in returning the instrument to the customer.
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SECTION 1 GENERAL INFORMATION

1.1 INTRODUCTION

Houston Instrument has combined high speed, accuracy, intelligence, and durability into the HIPLØT DMP-41 plotter and the DMP-42 plotter. These single-pen, digital plotters will prove to be the best friends you have in the graphics department, and Houston Instrument has made them rugged to ensure a lasting friendship.

Note that this manual covers both the DMP-41 plotter and the DMP-42 plotter. These plotters are operationally identical, the only difference is in the sizes of paper used. In the remainder of this manual, the term "plotter" is used to describe characteristics common to both plotters. The terms "DMP-41" or "DMP-42" are used to describe unique characteristics of that particular plotter.

A few of the features you'll find on your plotter are:

- DM/PL software protocol,
- Single port serial RS-232-C interface capabilities,
- Membrane control panel switches,
- 0.001 inch, 0.005 inch, or 0.1 mm user addressable resolution.
- Selectable plot formats for small or large paper,
- An extensive Self-Test capability,
- Window and viewport capabilities for "clipping" plots and graphs,
- Plotter-to-computer report capabilities,
- Character generation capabilities including 255 sizes for characters, which can be rotated to any slope and printed in italics.

and more!

This manual provides:

- Instructions on how to set up and manually operate the Plotter in local mode,
- Specifications to help you interface your Plotter with your computer system,
- Descriptions of your Plotter's DM/PL software capabilities,
- Schematics and parts lists for easy maintenance.

1.2 SPECIFICATIONS

The plotter specifications are listed below.

ITEM		SPECIFICATION
Plotter:		
Overall Height (adjustable)		32 to 36 inches (81.3 to 91.4 cm)
Width	DMP-41	32.25 inches (82 cm)
	DMP-42	33.50 inches (85.1 cm)
Depth		8 inches (20.3 cm)
Stand Base		16 inches (40.6 cm)
Weight		32 pounds (14.4 kg)
Shipping Weight		37 pounds (16.7 kg)
Plot Size (maximum)	DMP-41	15 × 20 inches or 20 × 32 inches

ITEM	SPECIFICATION
DMP-42	14.5 × 21.5 inches or 21.5 × 31 inches or 21.5 × 34 inches
Plotting Materials:	
Paper Size	DMP-41 17 × 22 inches (C size) (43.2 × 55.9 cm) or 22 × 34 inches (D size) (55.9 × 86.4 cm) DMP-42 16.54 × 23.39 inches (A2 size) (42.01 × 59.41 cm) or 23.39 × 33.11 inches (A1 size) (59.41 × 84.10 cm) or 24 × 36 inches (architectural) (60.96 × 91.44 cm)
Pens	Disposable technical pen
Media	Frost brite paper or vellum
Interface:	
Interfaces Available	Asynchronous serial RS-232-C, or Centronics compatible parallel, or IEEE-488 (GPIB), or Tektronix 4014 Compatible
I/O Port Connector	Rear panel, male connector. Type varies with interface used: 25 pin DB-25P for RS-232-C, or Tektronix 4014 compatible, or 24 pin IEEE-488 for GPIB, or 36 pin Centronics compatible for parallel
Mating Connector	Cable, female connector. Type varies with interface used: 25 pin DB-25S for RS-232-C or Tektronix 4014 compatible, or 24 pin IEEE-488 for GPIB, or 36 pin Centronics compatible for parallel
Byte Format	7 data bits, 1 parity bit (selectable), 2 stop bits
Baud Rate	300, 600, 1200, 2400, 4800, or 9600 baud
Firmware	DM/PL compatible

ITEM

SPECIFICATIONS

Environment:

Operating Temperature	32° to 95° F. (0° to 35° C.)
Relative Humidity	5% to 95% (non-condensing)

Performance:

Accuracy	± 0.35% of plotting area
Speed	3 inches per second axial, 4.2 inches per second diagonal
Addressable Resolution	0.001 inch, 0.005 inch, or 0.1 mm
Repeatability	± 0.005 inch (0.127 mm)

Power Requirements:

Input	100/120/220/240 VAC ± 10%, 50-60 Hz, single phase, 60 Watts
Fuse Ratings	1.0 Amp SLO-BLO at 100/120 VAC, 0.5 Amp SLO-BLO at 220/240 VAC

1.2.1 Supplies

The following supplies are available from your local dealer.

DISPOSABLE DRAFTING PENS

PART NO.	DESCRIPTION
MP-729*	Red, .35 mm
MP-730*	Blue, .35 mm
MP-731*	Black, .35 mm
MP-732*	Green, .35 mm
MP-737*	Red, .70 mm
MP-738*	Blue, .70 mm
MP-739*	Black, .70 mm
MP-740*	Green, .70 mm

* Adapter MA-15 not included.

PEN HOLDER ADAPTER FOR DRAFTING PEN

PART NO.	DESCRIPTION
MA-15	Drafting Pen Adapter

DRAFTING PEN KIT

PART NO.	DESCRIPTION
PK-8097	Kit includes: one .35 mm Black, one .35 mm Red, one .35 Blue, one .35 mm Green, MA-15 Pen Adapter

PAPER (50 SHEETS PER BOX)

VELLUM (50 SHEETS PER BOX)

DMP 41:

PART NUMBER	TYPE	SIZE	FORMAT
MC-3175	VELLUM	22 × 34	LARGE
MC-3176	VELLUM	17 × 22	SMALL
MC-3221	PAPER (FROST BRITE)	22 × 34	LARGE
MC-3222	PAPER (FROST BRITE)	17 × 22	SMALL

DMP 42:

PART NUMBER	TYPE	SIZE	FORMAT
MC-3220	PAPER (FROST BRITE)	24 × 36	LARGE
MC-3187	VELLUM	24 × 36	LARGE

NOTE

Remove the plastic packaging material from the paper or vellum at least 15 minutes before use. This allows it to stabilize dimensionally.

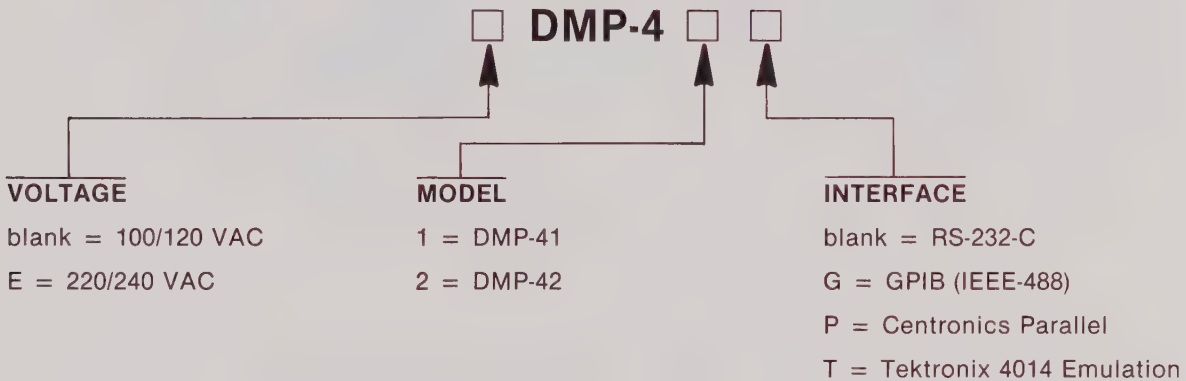
NOTE

Small format 17 × 22 inches is standard "C" drafting size. Large format 22 × 34 inches is standard "D" drafting size. Large format 23.39 × 33.11 inches is standard "A1" metric size. Small format 16.54 × 23.39 inches is standard "A2" metric size. Large format 24 × 36 inches is standard architectural size.

1.2.2 Model Numbering System

The following diagram shows the model numbering system used for the DMP-41 and DMP-42 plotters. The model number of your plotter is printed

on the label located on the bottom panel of the unit. For example, a model EDMP-41G is a DMP-41 plotter configured to operate on 220/240 VAC with a GPIB communications interface.



1.3 IDENTIFICATION OF REAR PANEL CONTROLS

Read through the following descriptions of the

rear panel controls and components and familiarize yourself with the plotter. The location of each component is illustrated in Figure 1-1.

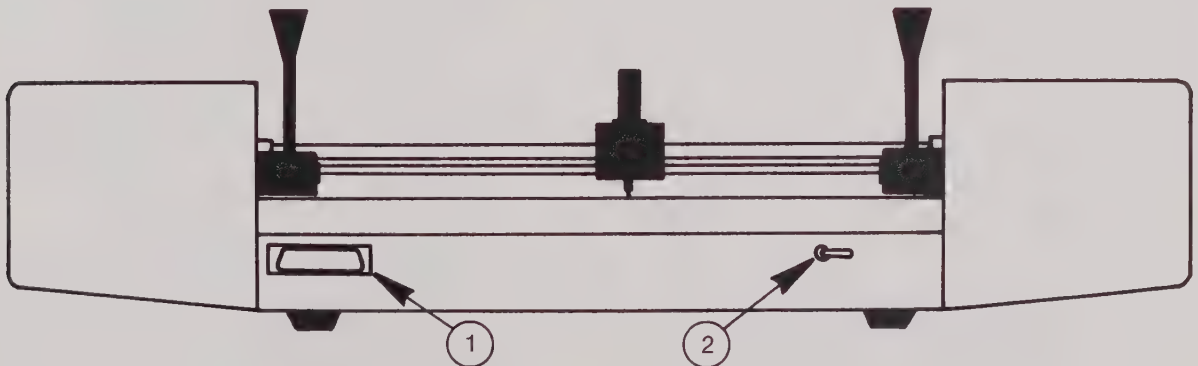


**FIGURE 1-1
REAR VIEW OF PLOTTER**

1 **SIGNAL CONNECTOR.** This connector allows the plotter to be interfaced to a host computer. Section 1.9, "Plotter To Computer Interface," explains how to connect the plotter to your computer system.

2 **POWER SWITCH.** This toggle switch turns the plotter's power on and off.

CAUTION

When using the POWER switch to reset the plotter manually (ON to OFF to ON), be sure to wait at least five seconds before powering back on. Otherwise, the plotter may jam (all LEDs on and the plotter does not respond to the control panel switches). If a jam occurs, power off the plotter for at least five seconds to restore normal operation.

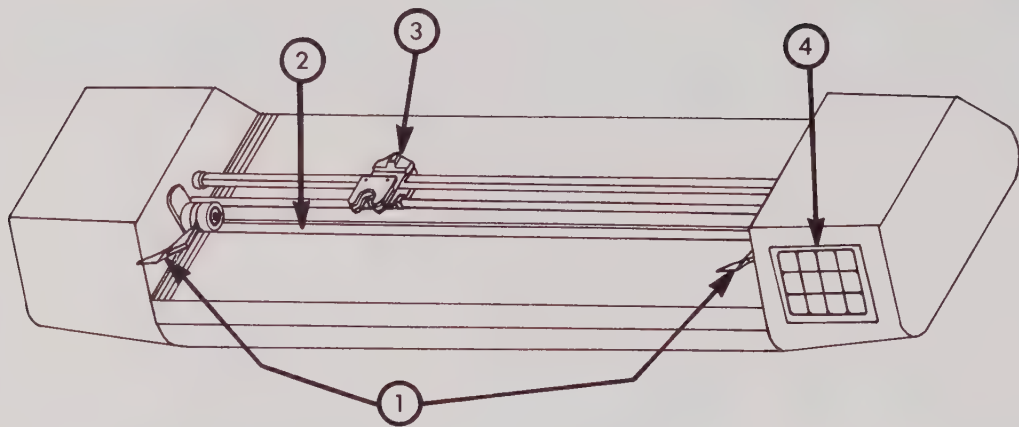


FIGURE 1-2
FRONT VIEW OF PLOTTER

1.4 IDENTIFICATION OF FRONT PANEL CONTROLS

Read through the following descriptions of the front panel controls and components and familiarize yourself with the plotter. The location of each component is illustrated in Figure 1-2.

① **PINCH ROLLER LEVER ARMS.** These two levers are used to raise (OPEN) and lower (CLOSE) the pinch rollers from the paper drive shaft during paper loading. (Paper loading is explained in paragraph 1.7.)

② **PAPER DRIVE SHAFT.** When the plotter is operated in LARGE chart format, this shaft drives the paper in the X direction. When the plotter is operated in SMALL chart format, the shaft drives the paper in the Y direction. (LARGE and SMALL chart formats are explained in paragraph 1.7.) The drive shaft moves the paper only when the pinch rollers are lowered to the shaft.

③ **PEN HOLDER.** The pen holder is a mount for the plotter's marking device—the pen. The pen holder is secured to the beam and moves the pen in the Y direction when the plotter is operated in LARGE chart format and in the X direction when the plotter is operated in the SMALL chart format. Paragraph 1.8 explains how to install a pen in the pen holder.

④ **CONTROL PANEL.** The plotter's control panel consists of 12 membrane (switch) touch buttons and four illuminating (on/off) indicators. All plotter activity must be initiated from the control panel functions. This includes initiating remote mode for computer control, local mode for manual operation of the pen and paper, and selecting baud rates, resolution, and window/scale box limit coordinates. Each control panel function is explained in paragraph 2.1, "The Control Panel."

1.5 MOUNT STAND ASSEMBLY

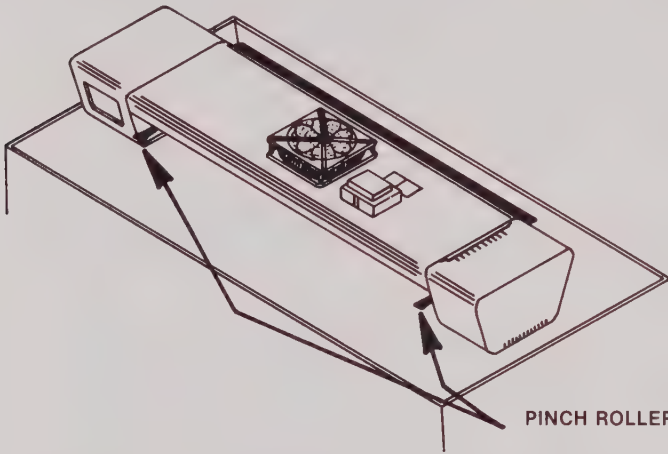
CAUTION

DO NOT operate the plotter until it has been secured to the mount stand. DO NOT connect the plotter to the power source when not attached to the mount stand. Otherwise, damage to the plotter or the plotting materials can result.

The following steps explain how to attach the plotter to the mount stand. All necessary mount stand parts, attaching hardware, and a special hex wrench are included with the plotter.

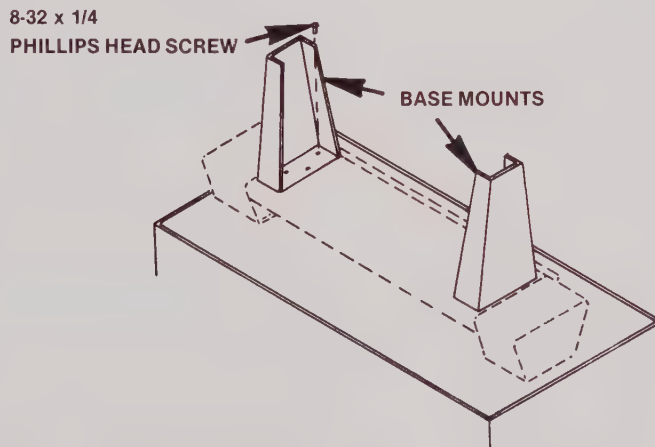
1. Verify that the pen holder does not have a pen installed.
2. Place both pinch roller lever arms in the closed position.

3. Place the plotter upside down on a flat surface as shown below.

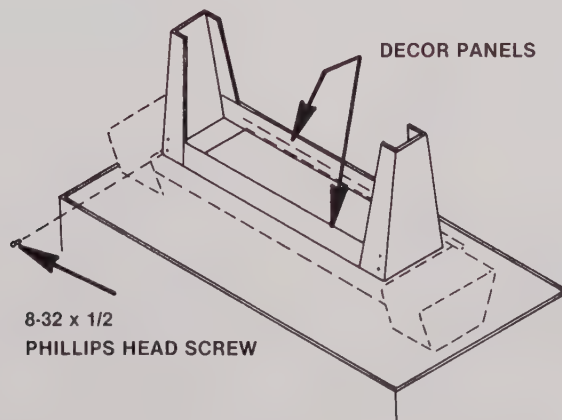
**CAUTION**

The pen holder **MUST** be empty and both pinch roller lever arms **MUST** be in the **CLOSED** position during these procedures.

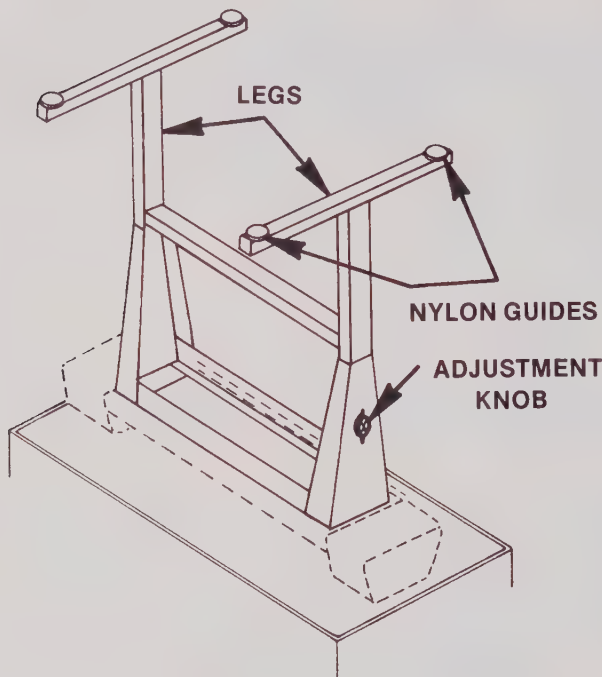
4. Place the base mounts on the plotter as shown below. Attach each base mount to the plotter using three 8-32 x 1/4 Phillips head screws.



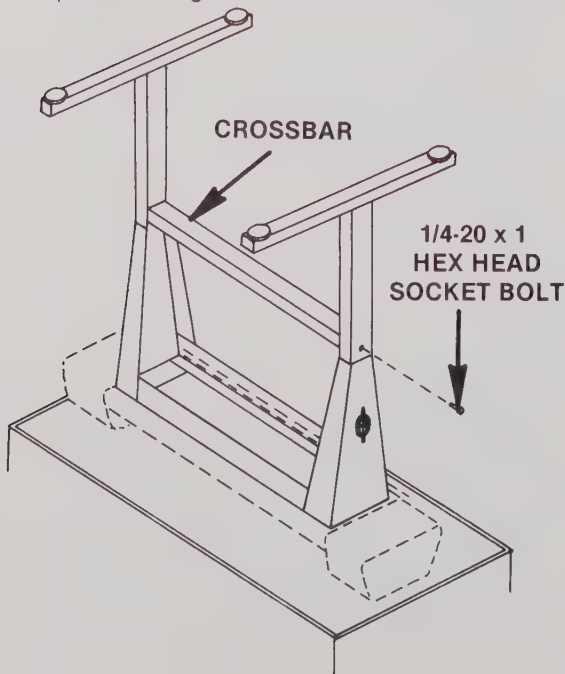
5. Place the two decor panels between, and inside of, the two base mounts as shown below. Attach each decor panel to the base mounts using two 8-32 x 1/2 Phillips head screws at each end.



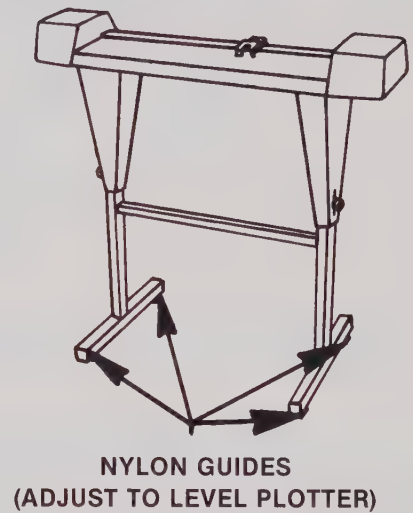
6. Place the two legs inside of the base mounts as shown below. Attach each leg to the base mount using one adjustment knob. Screw two nylon guides onto each leg as shown.



7. Place the crossbar between the two legs as shown below. Attach the crossbar to the legs using one 1/4-20 x 1 hex socket bolt at each end. Use the hex wrench provided with the plotter to tighten these bolts.



8. Carefully lift the plotter, turn it over, and set it in its installation location. Adjust the nylon guides on each leg as necessary to correct for an uneven floor.



1.6 POWERING UP THE PLOTTER

CAUTION

Be sure to check the plotter's operating voltage as described in the following paragraph. Otherwise, damage to the plotter may result.

DO NOT ATTACH THE POWER CORD to the plotter or the AC wall outlet until you have determined the plotter's operating voltage setting (100, 120, 220 or 240 VAC). To check the voltage setting, look through the bottom panel Fuse Cavity window at the number on the Select board (see Figure 1-3). This number will be either 100, 120, 220, or 240 and represents the plotter's voltage setting. If the number does not match the rating of your AC outlet, turn to paragraph 4.6, "Operating Voltage Conversion," and change the voltage setting and fuse rating before powering up the plotter.

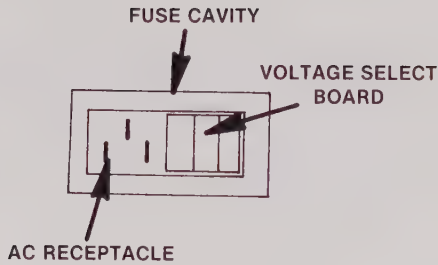
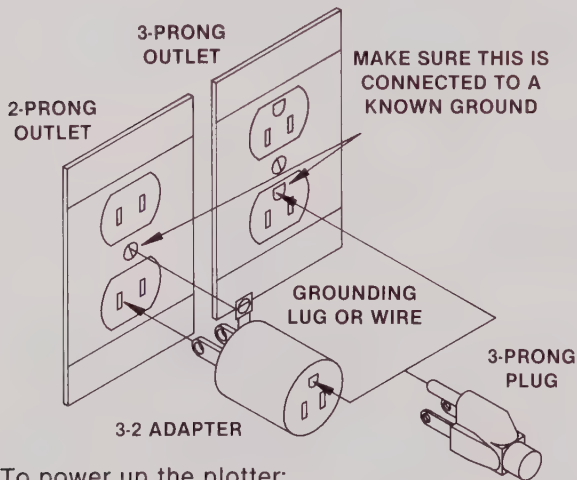


FIGURE 1-3
PLOTTER'S OPERATING VOLTAGE SETTING

The plotter's ground circuitry protects you from electrical shock. However, this protection is effective only if the AC outlet you use is properly grounded to earth. Always verify an AC outlet's earth ground before using it. If the plotter is to be connected to a two-contact wall outlet, a 3/2 adapter with grounding lug/wire may be used. This type of connection is illustrated below.



To power up the plotter:

1. With the plotter properly secured to its mount stand, connect one end of the power cord to the AC receptacle on the bottom panel of the plotter.
2. Connect the other end of the power cord to the AC wall outlet.
3. Set the rear panel power switch ON.

After power up, the plotter has the following default values:

- a) Plotter deselected.
- b) Buffer cleared.
- c) State 0 operating mode.
- d) 2400 baud.
- e) Send XON.

- f) Move to load position.
- g) Shuffle paper.
- h) 0.005 inch resolution.
- i) Maximum window limits.
- j) Maximum scale limits.
- k) Pen change enable function disabled.
- l) Character set 0.
- m) Horizontal text path.
- n) Character size 8.
- o) Italics off (non-Italic character set enabled)
- p) Velocity 3 inches per second (maximum).

1.7 PAPER LOADING

CAUTION

When handling plotting paper, do not touch the printing area. Handle it by the edges only! Fingerprints leave a residue on the paper that can cause the pen to skip.

The LARGE and SMALL control panel buttons change the plotter's chart format. This allows you to use small (17×22 inches for the DMP-41, 16.54×23.39 inches for the DMP-42) or large (22×34 inches for the DMP-41, 23.39×33.11 inches or 24×36 inches for the DMP-42) paper to create your plots and graphs. You can also change the chart format in your software when you are operating the plotter from your computer. The DM/PL commands are Small Chart (EH) and Large Chart (EF) and are explained in your DM/PL manual.

CAUTION

Remove the plastic packaging material from the paper or vellum at least 15 minutes before use. This allows it to stabilize dimensionally.

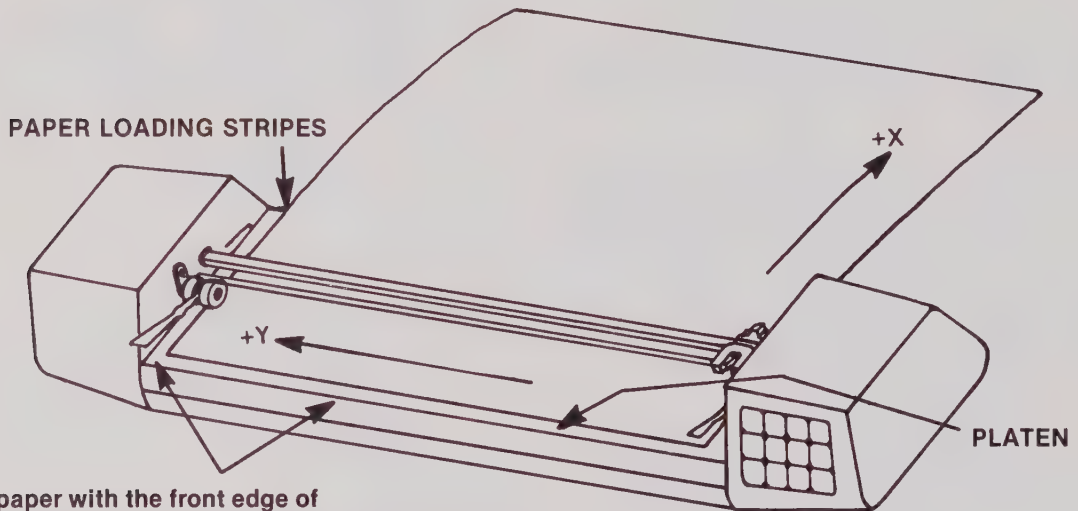
NOTE

The plotter uses vacuum to secure the center area of the paper to the drive shaft. The plotter's POWER switch turns the vacuum motor on and off.

To load large paper, follow the procedure below.

1. Set the power on. (The plotter defaults to LARGE chart format when the power is turned on.)

2. Raise each pinch roller arm to disengage the rollers from the paper drive shaft.
3. Insert the paper between the pinch rollers and the paper drive shaft and position it as shown in Figure 1-4.
4. When the paper is positioned, lower the pinch rollers to the surface of the paper by gently pushing down on the lever arms.
5. The large paper is now properly loaded.



Align the paper with the front edge of the platen and the appropriate paper loading stripe. For the DMP-41, use the inside stripe. For the DMP-42, use the outside stripe.

**FIGURE 1-4
LOADING LARGE PAPER**

To load small paper, follow the procedure below.

1. Set the power on.
2. Press the SMALL button on the control panel.
3. Raise each pinch roller arm to disengage the rollers from the paper drive shaft.
4. Insert the paper between the pinch rollers and the paper drive shaft and position it as shown in Figure 1-5.
5. When the paper is positioned, lower the pinch rollers to the surface of the paper by gently pushing down on the lever arms.
6. The small paper is now properly loaded.

When you change from one paper size to another during your plotting sessions, remember to change the plotter's chart format as well.

The SMALL and LARGE chart format buttons are also used to manually reset the plotter. This function is detailed in paragraph 2.2.

Use the following procedures to change paper during a plot. This will allow you to do multiple page plots without having to enter plotter parameters again.

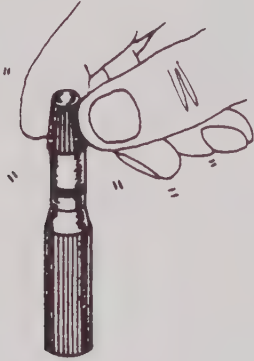
1. When the first page is completed, press the plotter LOCAL switch once.
2. Remove the paper.
3. Load the new paper.
4. Press the plotter LOCAL switch once. Plotting will resume.
5. Repeat steps 1 through 4 as required.

1.8 PENS

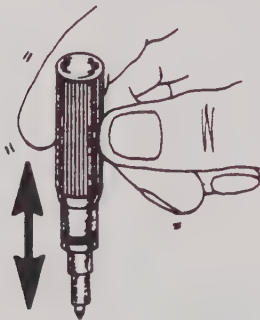
The pens that are supplied with your plotter are disposable drafting pens specially designed for computer graphics. A variety of pen tip sizes and other plotting accessories are available from your local dealer (see Section 1.2.1).

The following procedure explains how to install a pen in a plotter.

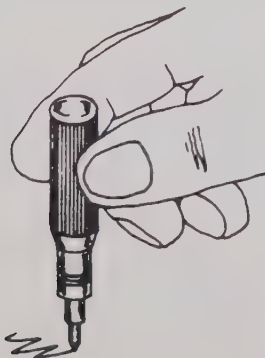
1. Remove the completely assembled disposable technical pen from the storage box. To use the pen for the first time, press downward on the pen cap to push the nib into the body of the ink cartridge to break its seal.



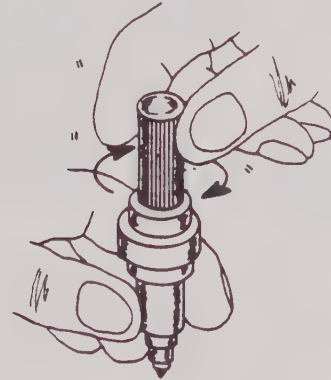
2. Remove and save the pen cap. Briskly shake the pen twice to begin ink flow.



3. Hand draw on scrap paper or vellum to verify its operation.



4. Screw pen into the adapter until hand tight (the pen only fits into the adapter the correct way). Clip the pen assembly into the plotter's pen holder. Remove the pen assembly from plotter to change pens. Use with paper or vellum only.



5. When the pen is not in use, cap and store it in the storage box in a horizontal position. Use the short blue pen cap if the pen is in the adapter. Use the long clear pen cap if the pen is not in the adapter.

SHORT BLUE CAP

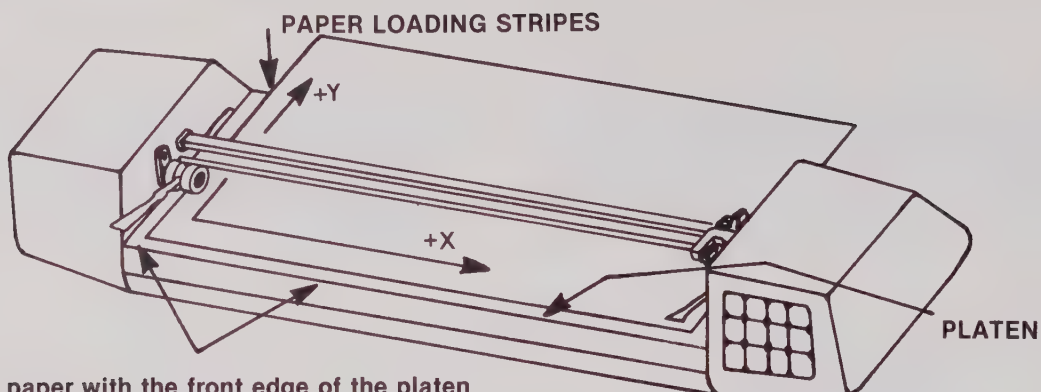
PEN AND ADAPTER



LONG CLEAR CAP

PEN ONLY





Align the paper with the front edge of the platen and the appropriate paper loading stripe. For the DMP-41, use the inside stripe. For the DMP-42, use the outside stripe.

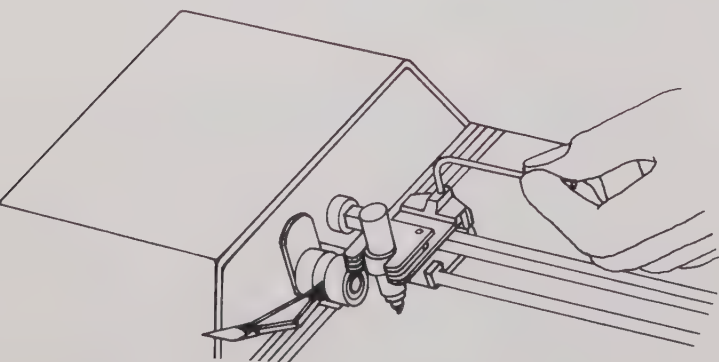
FIGURE 1-5
LOADING SMALL PAPER

6. To restart a pen after storage, remove and save the pen cap. Briskly tap the pen body on a hard surface to restart ink flow.



When the plotter is not in use, always remove the pen and replace its protective cap.

The pressure of the pen on the paper may have to be adjusted from time to time. To adjust the pressure, insert the supplied Allen key in the small hex nut on the top of the pen holder. Turn the hex nut clockwise to increase the pressure or turn it counterclockwise to decrease it. The ideal pressure is when the pen will draw a fine line without skipping. (Note that the Self-Test plot provides an excellent opportunity to determine the condition of your pens and to make adjustments to the pen pressure.)



1.9 PLOTTER TO COMPUTER INTERFACE

The plotter is equipped with a rear panel I/O data connector, which allows all plotting activity to be controlled from your computer. The type of connector installed on the plotter is determined by its interface capability: serial RS-232-C (models DMP-4X), Centronics parallel (models DMP-4XP), IEEE-488 GPIB (models DMP-4XG), or Tektronix 4014 (models DMP-4XT).

Regardless of the type of interface your plotter and computer system use, the two devices must be connected by a data cable to communicate with one another. Refer to the paragraph that pertains to your plotter's particular interface type for the cable connection instructions (paragraph 1.9.1, "Serial RS-232-C," paragraph 1.9.2, "Centronics Parallel," paragraph 1.9.3, "IEEE-488 GPIB," or paragraph 1.9.4, "Tektronix 4014-Compatible").

1.9.1 Serial RS-232-C

The plotter is equipped with a standard RS-232-C DB-25P connector on its rear panel (see Figure 1-1). This I/O jack requires a standard RS-232-C DB-25S mating connector.

Before attempting to connect the plotter to your system, consult your computer owner's/interface manual and determine what your computer's interface signal requirements are. In general, you will need to know:

- Which RS-232-C I/O port is recommended by your computer's manufacturer for use with other external equipment?
- Is your computer considered as DCE or DTE type equipment?

- What are your computer's handshaking capabilities (hardware, XON/XOFF, software), and what type do you prefer?
- Does your computer/modem require Request To Send (RTS), Clear To Send (CTS), and/or Data Terminal Ready (DTR) signal response?

The plotter uses the following lines on the rear panel RS-232-C I/O connector for hardware handshaking in both DM/PL Mode One and Mode Two. (DM/PL Mode One and Mode Two hardware handshaking sequences are explained in your DM/PL manual.)

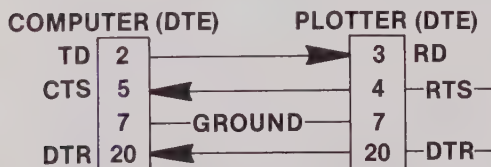
PLOTTER REAR PANEL CONNECTOR

PIN NO.	SIGNAL NAME	DIRECTION
2	Transmit Data (TD)	From plotter
3	Receive Data (RD)	To plotter
4	Request To Send (RTS)	From plotter
5	Clear To Send (CTS) (DO NOT USE)	To plotter
7	Signal Ground	To plotter
20	Data Terminal Ready (DTR)	From plotter

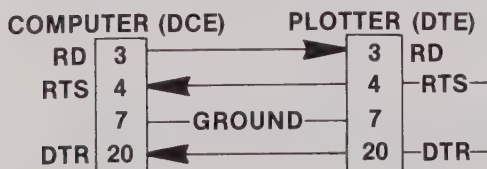
The plotter rear panel connector signals are explained below:

- Receive Data, Pin 3. The plotter always receives data at this pin, regardless of the operating mode.
- Transmit Data, Pin 2. The plotter uses this pin to transmit data to the computer while in Mode Two.

MODE I: HARDWARE HANDSHAKE (MODEM CONVENTION)



MODE I: HARDWARE HANDSHAKE (TERMINAL CONVENTION)



NOTES:

1. THESE DIAGRAMS SHOW BASIC CONNECTIONS ONLY. YOUR COMPUTER MAY REQUIRE ADDITIONAL CONNECTIONS.
2. PLOTTER PINS 4 AND 20 ARE INTERNALLY CONNECTED.
3. THE PLOTTER IS ALWAYS A DTE DEVICE.

- Request To Send, Pin 4, and Data Terminal Ready, Pin 20. These two pins are internally connected in the plotter. This signal is used during Mode One handshaking. A high signal level tells the computer that the plotter is ready for more data (the plotter buffer is not full). A low signal level tells the computer to wait until the plotter can accept more data (the plotter buffer is full).
- Clear To Send, Pin 5. It is recommended that no connection be made to this pin. Otherwise, if this pin is pulled low to inhibit the plotter and it then goes high, the plotter may not handshake properly with the computer in subsequent operations.
- Signal Ground, Pin 7. Required signal ground.

As described above, the plotter is considered to be a DTE type device. The host computer can be either a DTE or a DCE type device—the plotter will operate with either. The other major operating consideration is whether Mode One (hardware handshaking) or Mode Two (XON/XOFF or software handshaking) is used. These four factors determine how you connect the computer to the plotter. The diagrams below show the basic connections for these different combinations of computer and plotter. It is important to note that these are BASIC connections only. Your computer MAY require additional connections in order to operate properly. Refer to the H.I. Interface Notes Supplement (MI-1023), which is supplied with your plotter.

MODE I: XON/XOFF OR MODE II: SOFTWARE HANDSHAKE (MODEM CONVENTION)



MODE I: XON/XOFF OR MODE II: SOFTWARE HANDSHAKE (TERMINAL CONVENTION)



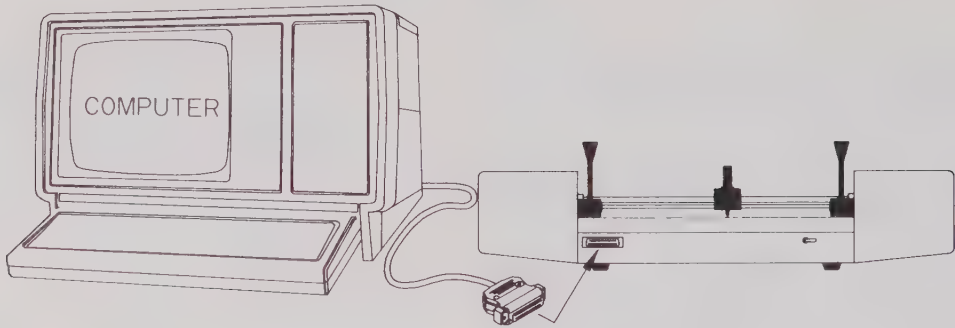


FIGURE 1-6
RS-232-C CONFIGURATION

Because of the many misinterpretations of the RS-232-C interface “standards” in the commercial computer industry, you can save yourself a great deal of time and frustration when attempting to connect the plotter to your computer by simply making your own data cable. Besides, many computer owners have discovered that some of the best cables they have owned were made on their kitchen tables. Cable fabrication is inexpensive and requires very little technical skill. Your local dealer or electrical parts house can supply you with the cable wires, end connectors, and the tools you will need to construct a quality data cable.

When constructing a data cable, always shield each individual signal wire, as well as the entire cable, to prevent internal “cross-talk” and electrical noise from occurring. The mating connectors for the plotter must be a RS-232-C DB-25S connector. Your computer owner’s manual will supply the type of mating connectors required for your equipment. The overall length of a data cable should be limited to 15 feet (4.6 meters).

The number of signal wires required in your cable, and to which pins on the end connectors you should connect them, depend on the type of device that your equipment is considered as (DCE or DTE), and the type of handshaking you prefer. After you have determined this information, use the appropriate cabling diagram to build your cable.

Connect the data cable to the plotter and your computer as described below.

1. Power off the plotter and the computer (and CRT terminal, if configured).
2. Plug the cable’s DB-25S end connector into the plotter’s rear panel RS-232-C data connector (see Figure 1-1).

3. Plug the cable’s other end connector into the computer’s RS-232-C data connector. (Consult the computer owner’s manual for the location of the connector on the computer.)
4. Power up the equipment as described in the owner’s manual for each device.

Figure 1-6 illustrates a typical Single Port RS-232-C configuration.

1.9.2 Centronics Parallel

The plotter must communicate with the computer through its rear panel PARALLEL PORT connector. Connect the data cable to the plotter and the computer as described below.

NOTE

Before interfacing the plotter and the computer, consult the computer owner’s manual for possible interface guidelines or recommendations from its manufacturer.

1. Power off the plotter and the computer (and CRT terminal, if configured).
2. Plug one end of the data cable into the plotter’s rear panel PARALLEL PORT connector and the other end of the data cable into the computer’s parallel data connector.
3. Power up the equipment as described in the owner’s manual for each device.

CENTRONICS INTERFACE SIGNAL NODES

SIGNAL PIN	RETURN PIN	SIGNAL NAME	NOTES
1	19	DATA STROBE	> 0.5 μ Sec pulse used to clock data from the processor to the plotter.
2	20	DATA 1	Data input.
3	21	DATA 2	Data input.
4	22	DATA 3	Data input.
5	23	DATA 4	Data input.
6	24	DATA 5	Data input.
7	25	DATA 6	Data input.
8	26	DATA 7	Data input.
9	27		Not used.
10	28	ACK	Acknowledge data received.
11	29	BUSY	Plotter busy.
12		PE	Tied to ground.
13		READY	Plotter ready to receive data (tied to pin 32).
14		$\pm 0V$	Tied to ground.
15			Not used.
16		$\pm 0V$	Tied to ground.
17			Not used.
18		+ 5V	
31	30		Not used.
32		READY	Plotter ready to receive data (tied to pin 13).
33		LD	Tied to ground.
34			Not used.
35			Not used.
36			Not used.

1.9.3 IEEE-488 GPIB

The plotter communicates with the computer through its rear panel IEEE-488 GPIB connector. Connect the GPIB data cable to the plotter and the computer as described below, and then read the IEEE-488 GPIB operating considerations in paragraph 1.9.3.1.

NOTE

Before interfacing the plotter and the computer, consult the computer owner's manual for possible interface guidelines or recommendations from its manufacturer.

1. Power off the plotter and the computer (and CRT terminal, if configured).

2. Plug one end of the data cable into the plotter's rear panel IEEE-488 connector and the other end of the cable in the computer's data port (IEEE-488) connector.
3. Read paragraph 1.9.3.1, "IEEE-488 Operating Considerations," before powering up the equipment.

IEEE-488 SIGNAL NAMES

PIN NO.	SIGNAL NAME	DESCRIPTION
1	DI01	Data bit 1
2	DI02	Data bit 2
3	DI03	Data bit 3
4	DI04	Data bit 4
5	EOI	End or identify
6	DAV	Data valid
7	NRFD	Not ready for data
8	NDAC	Not data accepted
9	IFC	Interface clear
10	SRQ	Service request
11	ATN	Attention
12	FG	Frame ground
13	DI05	Data bit 5
14	DI06	Data bit 6
15	DI07	Data bit 7
16	DI08	Data bit 8
17	REN	Remote enable
18	GND	Ground
19	GND	Ground
20	GND	Ground
21	GND	Ground
22	GND	Ground
23	GND	Ground
24	GND	Ground

1.9.3.1 IEEE-488 Operating Considerations

IEEE-488 (1978) describes a standard for an electronic laboratory instrumentation bus that is capable of supporting up to 31 IEEE-488 compatible devices. The Houston Instrument General Purpose Interface Bus (GPIB) satisfies all standard IEEE-488 electrical and mechanical interface requirements. That is, the GPIB enables the plotter to interface with other IEEE compatible equipment with standard IEEE bus connectors and cables.

In general, IEEE-488 describes online equipment as either talkers, listeners, or controller. The controller device is a host computer. When an online instrument is "asked" (polled) by the controller for input data, the instrument supplies the information and is considered to be a talker. When the controller has input data for an instrument, the controller tells the device to "listen," or to receive and process the data.

The controller identifies each individual instrument on the bus by the instrument's unique five-bit device address (0-30).

The following is a list of the IEEE-488/1978 functions:

- a) Source Handshake (SH1)
- b) Acceptor Handshake (AH1)
- c) Talker (T2) Serial Poll
- d) Listener (L2)
- e) Service Request (SR1)
- f) Parallel Poll (PP2)
- g) No Device Trigger (DT0)
- h) No Remote Local (RL0)

The plotter's device address and mode of hardware handshake are determined by the setting of an eight-position DIP switch. This switch is located on the IEEE-488 Interface board.

Refer to Figure 1-7 for the following descriptions of each IEEE-488 DIP switch setting.

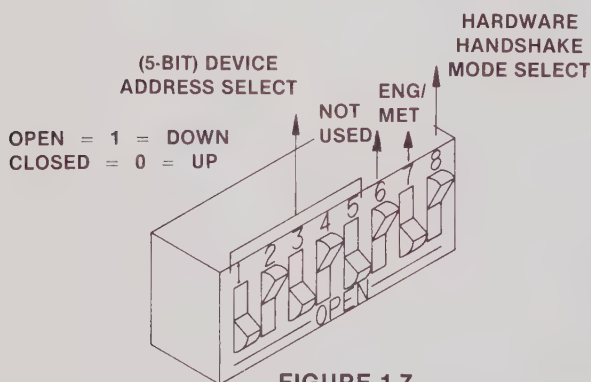


FIGURE 1-7
GPIB I/O BOARD DIP SWITCH

SWITCHES 1 THROUGH 5: These five settings select the plotter's device address (see Table 1-1 and Device Address Considerations). Note that switch 1 is the MSB (most significant bit); switch 5 is the LSB (least significant bit).

SWITCH 6: Not used.

SWITCH 7: This switch selects the standard of measure for the step size (English/metric). If POS. 7 is set at closed (up), the step size is measured in English units (.005"). If the switch is set at open (down), the step size is measured in metric units (.1mm).

SWITCH 8: This setting selects the type of hardware handshake. If software handshaking (DM/PL Mode Two) is selected, switch 8 is ignored.

If set to "0" (closed), the plotter will cause the bus to hang when the buffer is full.

If set to "1" (open), the plotter sends a service request when the buffer is full. If the device address is 1, 2, 3, 4, 5, 6, 7, or 8, then the plotter will implement parallel poll on the respective data bit (1-8). For example, if the plotter has a device address of 3, it will send a service request and respond to parallel poll on data bit 3 when the buffer is full.

Device Address Considerations

When the plotter is addressed by the controller (GPIB ATN line active), a seven-bit ASCII address/command character called the plotter listen/talk device address is received on the plotter GPIB. The controller identifies an on-line instrument by its device address; therefore, each instrument that is placed on the GPIB must have a unique address. Bits 0, 1, 2, 3, and 4 of the seven-bit ASCII character determine the plotter's device address; the remaining two bits, 5 and 6, command the plotter to either talk or listen.

When the plotter listen bit (bit 5) is high (ON), the plotter is instructed to receive and process data. When the plotter talk bit (bit 6) is high (ON), the plotter is instructed to transmit data to the controller. The status of these two bits will determine the value of the plotter's ASCII talk command character and listen command character. For example, ASCII % is the listen command character for a plotter with a device address of 5 (see Figure 1-8) and ASCII E is the talk command character (see Figure 1-9). The ASCII character for each plotter talk/listen device address is shown in Table 1-1.

The following example is a plotter listen address for ;T from an AppleTM controller to a plotter with a device address of 5:

```
10 PRINT "WT%";Z$";T"
```

where ASCII % = 0100101 = device #5 listen, and Z\$ = CHR\$(26).

To determine the address requirements for your computer, refer to its operation/software manual.

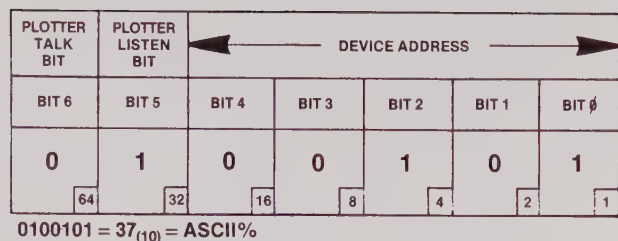


FIGURE 1-8

EXAMPLE PLOTTER LISTEN ADDRESS

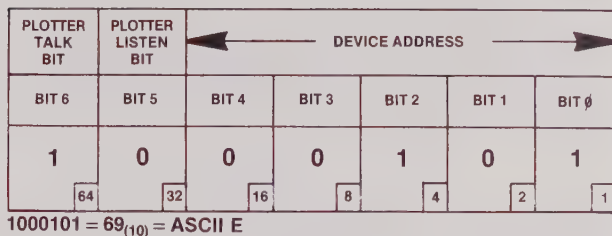


FIGURE 1-9

EXAMPLE PLOTTER TALK ADDRESS

TABLE 1-1
 GPIB DEVICE ADDRESS SELECT

POSITION 1 2 3 4 5	ADDRESS	PLOTTER TALK	PLOTTER LISTEN
0 0 0 0 0	0	@	(space)
0 0 0 0 1	1	A	!
0 0 0 1 0	2	B	''
0 0 0 1 1	3	C	#
0 0 1 0 0	4	D	\$
0 0 1 0 1	5	E	%
0 0 1 1 0	6	F	&
0 0 1 1 1	7	G	'
0 1 0 0 0	8	H	(
0 1 0 0 1	9	I	)
0 1 0 1 0	10	J	*
0 1 0 1 1	11	K	+
0 1 1 0 0	12	L	,
0 1 1 0 1	13	M	-
0 1 1 1 0	14	N	.
0 1 1 1 1	15	O	/
1 0 0 0 0	16	P	0
1 0 0 0 1	17	Q	1
1 0 0 1 0	18	R	2
1 0 0 1 1	19	S	3
1 0 1 0 0	20	T	4
1 0 1 0 1	21	U	5
1 0 1 1 0	22	V	6
1 0 1 1 1	23	W	7
1 1 0 0 0	24	X	8
1 1 0 0 1	25	Y	9
1 1 0 1 0	26	Z	:
1 1 0 1 1	27	[	;
1 1 1 0 0	28	\	<
1 1 1 0 1	29	]	=
1 1 1 1 0	30	(caret)	>
NOTES: 1. Open = 1. 2. Closed = 0.			

GPIB Status Byte

The eight-bit GPIB status byte contains the plotter's status information required by the controller for monitoring (polling) purposes. The status byte is coded as follows:

GPIB STATUS BYTE

BIT NO.	FUNCTION
0	Current pen selected
1	
2	
3	
4	0 = local mode 1 = remote mode
5	0 = buffer full 1 = buffer ready
6	0 = no SRQ 1 = SRQ pending
7	0 = plotter deselected 1 = plotter selected

1.9.4 Tektronix™ 4014-Compatible

The model DMP-41T and DMP-42T are Tektronix 4014-compatible plotters. They will emulate a Tektronix 4014 terminal when interfaced with a Tektronix 4014 system.

The following paragraphs describe the interface, addressing, and programming of these plotters. It is assumed that the user is familiar with the Tektronix 4014 and has access to the appropriate Tektronix documentation.

1.9.4.1 Description

The following features are implemented in the Tektronix 4014-compatible plotters.

- Serial RS-232-C interface capability.
- 4096 or 1024 X,Y addressability.
- ALPHA, GRAPHIC, and WRITE-THRU mode operation.

- Vector line format processing.
- Wide line multi-stroking capability to simulate de-focusing of the Z-axis.
- Maximum plot coordinates:

Home (x) 0, (y) 0.

Lower right (x) + 4095, (y) 0.

Upper right (x) + 4095, (y) + 3120.

Upper left (x) 0, (y) + 3120.

1.9.4.2 Interface

The plotter interfaces to the Tektronix 4014 system using RS-232-C protocol. Refer to paragraph 1.9.1 for the interface considerations.

1.9.4.3 Addressable Resolution

This feature allows GRAPH mode addressing of the plotter on a matrix of 4096X by 4096Y points. This increases the address resolution by a factor of four over the standard 1024X by 1024Y. This address resolution requires that two additional bits (12 bits total) be added to each axis address. Therefore, an "Extra" byte must be inserted in the vector addressing string. 4096 addressability is upwards and downwards compatible with 1024 (10 bit) software (4010, 4012, and 4013), and vice-versa.

To establish an address in the addressable point grid of 4096X by 4096Y, 12 bits of X and 12 bits of Y data (24 bits total) must be transmitted to the plotter. This necessitates the use of an "Extra" seven-bit byte in the vector address. The transmission order is shown in Table 1-2, which also shows the byte content.

**TABLE 1-2
VECTOR ADDRESS DATA STRING**

BYTE NAME	TAG BITS		7-BIT ASCII CHARACTER				
			ADDRESS BITS				
	7	6	5	4	3	2	1
High Order Y (HIY)	0	1	5 MSB of Y Address				
Extra Byte	1	1	*	Y ₂	Y ₁	X ₂	X ₁
Low Order Y (LOY)	1	1	5 intermediate bits of Y Address				
High Order X (HIX)	0	1	5 MSB of X Address				
Low Order X (LOX)	1	0	5 intermediate bits of X Address				

* Note that Bits 7 and 6 of the Extra Byte must be one's (1). Bit 5 can be used to set Margin 1. Bits 4 and 3 contain the two least significant bits (LSB) of the 12-bit Y Address, and Bits 2 and 1 contain the two least significant bits (LSB) of the 12-bit X Address.

The plotter's holding register (buffer) for the "extra" byte always clears to zero (0) when the plotter is powered down or reset.

The following paragraphs describe the commands that the plotter will respond to. All other Tektronix commands are ignored by the plotter.

GS command for GRAPHIC mode operation.

To initialize the plotter with the computer system, an operating mode must be specified by the computer. The plotter, like the 4014, must be issued either an ALPHA mode US command or a GRAPHIC mode GS command. After either mode is specified, the plotter can then be operated in that particular mode or branched to another operating mode. This is illustrated in Figure 1-10.



FIGURE 1-10
PERMISSIBLE OPERATING MODE CHANGES

1.9.4.4.2 Home

ESC FF

The ESC FF will move the pen to home position (0,0) and enter ALPHA mode.

1.9.4.4.3 Pen Select (Multi-Pen Models Only)

(ESC p) P_n

n is a numeric expression between zero (0) and eight (8). If *n* is:

0, the plotter will return the currently used pen to its correct stall.

1, the plotter will retrieve pen #1.

2, the plotter will retrieve pen #2.

3, the plotter will retrieve pen #3.

4, the plotter will retrieve pen #4.

5, the plotter will retrieve pen #5.

6, the plotter will retrieve pen #6.

7, the plotter will retrieve pen #7.

8, the plotter will retrieve pen #8.

The plotter must be placed in WRITE-THRU mode before it will execute Pen Select commands. (An ESC p sequence must precede the Pen Select command.) After the plotter is placed in WRITE-THRU mode (ESC p), the plotter will process Pen Select commands until it receives some other ESC sequence, i.e., ESC FF.

1.9.4.4.4 Line Type Select

Vector line types (and focus) are dependent on the last control sequence received. GS sets the GRAPHIC mode, but the next control sequence of **ESC plus** some lower case character code, determines the vector line type. This information is provided in Table 1-3.

All vector writing starts at the beginning of the longest written element of the vector pattern; i.e., the dot-dash pattern always starts at the beginning of the dash.

Vector writing rate is the same as for the standard 4014 and 4015 terminals.

1.9.4.4.5 Multi-stroking for Wide Lines

To simulate de-focusing of the Z-axis, the plotter incorporates a rudimentary multi-stroking to create wide lines. When multi-stroking is selected, the plotter first draws the assigned vector. Without lifting the pen, the plotter moves a fixed offset in the minor axis, and the vector is then re-drawn in the opposite direction. The pen then crosses the original starting point and offsets on the opposite side of the vector and the original vector is re-drawn. In this fashion, each wide line is created using six pen strokes as illustrated in Figure 1-11. (The offset equals 0.008 inch.)

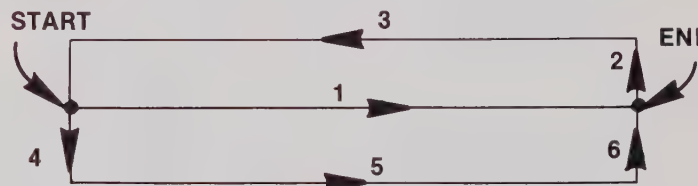


FIGURE 1-11
PEN MOVEMENT FOR WIDE LINES

TABLE 1-3
BEAM AND VECTOR SELECTORS

ASCII CHARACTER	DECIMAL	FUNCTION
ESC ‘	96	normal z axis, normal vectors or alpha
ESC a	97	normal z axis, dotted vectors
ESC b	98	normal z axis, dot-dashed vectors
ESC c	99	normal z axis, short dashed vectors
ESC d	100	normal z axis, long dashed vectors
ESC h	104	defocused z axis, normal vectors or alpha
ESC i	105	defocused z axis, dotted vectors
ESC j	106	defocused z axis, dot-dashed vectors
ESC k	107	defocused z axis, short dashed vectors
ESC l	108	defocused z axis, long dashed vectors
ESC p	112	write-thru mode, normal vectors or alpha
ESC q	113	write-thru mode, dotted vectors
ESC r	114	write-thru mode, dot-dashed vectors
ESC s	115	write-thru mode, short dashed vectors
ESC t	116	write-thru mode, long dashed vectors

1.9.4.5.1 Coordinate Conversion Chart

TABLE 1-4

DEC
ASCII

HIGH ORDER X AND Y

TABLE 1-4
COORDINATE CONVERSION TABLE
(CONTINUED)

LOW ORDER X ASCII DEC		X OR Y COORDINATE								LOW ORDER Y DEC ASCII	
@	64	512	544	576	608	640	672	704	736	96	'
A	65	513	545	577	609	641	673	705	737	97	a
B	66	514	546	578	610	642	674	706	738	98	b
C	67	515	547	579	611	643	675	707	739	99	c
D	68	516	548	580	612	644	676	708	740	100	d
E	69	517	549	581	613	645	677	709	741	101	e
F	70	518	550	582	614	646	678	710	742	102	f
G	71	519	551	583	615	647	679	711	743	103	g
H	72	520	552	584	616	648	680	712	744	104	h
I	73	521	553	585	617	649	681	713	745	105	i
J	74	522	554	586	618	650	682	714	746	106	j
K	75	523	555	587	619	651	683	715	747	107	k
L	76	524	556	588	620	652	684	716	748	108	l
M	77	525	557	589	621	653	685	717	749	109	m
N	78	526	558	590	622	654	686	718	750	110	n
O	79	527	559	591	623	655	687	719	751	111	o
P	80	528	560	592	624	656	688	720	752	112	p
Q	81	529	561	593	625	657	689	721	753	113	q
R	82	530	562	594	626	658	690	722	754	114	r
S	83	531	563	595	627	659	691	723	755	115	s
T	84	532	564	596	628	660	692	724	756	116	t
U	85	533	565	597	629	661	693	725	757	117	u
V	86	534	566	598	630	662	694	726	758	118	v
W	87	535	567	599	631	663	695	727	759	119	w
X	88	536	568	600	632	664	696	728	760	120	x
Y	89	537	569	601	633	665	697	729	761	121	y
Z	90	538	570	602	634	666	698	730	762	122	z
[	91	539	571	603	635	667	699	731	763	123	{
\	92	540	572	604	636	668	700	732	764	124	
]	93	541	573	605	637	669	701	733	765	125	}
^	94	542	574	606	638	670	702	734	766	126	~
_	95	543	575	607	639	671	703	735	767	127	DEL
DEC ASCII		48	49	50	51	52	53	54	55		
		0	1	2	3	4	5	6	7		
		HIGH ORDER X AND Y									

TABLE 1-4
COORDINATE CONVERSION TABLE
(CONTINUED)

LOW ORDER X ASCII DEC		X OR Y COORDINATE								LOW ORDER Y DEC ASCII	
@	64	768	800	832	864	896	928	960	992	96	'
A	65	769	801	833	865	897	929	961	993	97	a
B	66	770	802	834	866	898	930	962	994	98	b
C	67	771	803	835	867	899	931	963	995	99	c
D	68	772	804	836	868	900	932	964	996	100	d
E	69	773	805	837	869	901	933	965	997	101	e
F	70	774	806	838	870	902	934	966	998	102	f
G	71	775	807	839	871	903	935	967	999	103	g
H	72	776	808	840	872	904	936	968	1000	104	h
I	73	777	809	841	873	905	937	969	1001	105	i
J	74	778	810	842	874	906	938	970	1002	106	j
K	75	779	811	843	875	907	939	971	1003	107	k
L	76	780	812	844	876	908	940	972	1004	108	l
M	77	781	813	845	877	909	941	973	1005	109	m
N	78	782	814	846	878	910	942	974	1006	110	n
O	79	783	815	847	879	911	943	975	1007	111	o
P	80	784	816	848	880	912	944	976	1008	112	p
Q	81	785	817	849	881	913	945	977	1009	113	q
R	82	786	818	850	882	914	946	978	1010	114	r
S	83	787	819	851	883	915	947	979	1011	115	s
T	84	788	820	852	884	916	948	980	1012	116	t
U	85	789	821	853	885	917	949	981	1013	117	u
V	86	790	822	854	886	918	950	982	1014	118	v
W	87	791	823	855	887	919	951	983	1015	119	w
X	88	792	824	856	888	920	952	984	1016	120	x
Y	89	793	825	857	889	921	953	985	1017	121	y
Z	90	794	826	858	890	922	954	986	1018	122	z
[	91	795	827	859	891	923	955	987	1019	123	{
\	92	796	828	860	892	924	956	988	1020	124	
]	93	797	829	861	893	925	957	989	1021	125	}
^	94	798	830	862	894	926	958	990	1022	126	~
_	95	799	831	863	895	927	959	991	1023	127	DEL
DEC ASCII		56	57	58	59	60	61	62	63		
		8	9	:	;	<	=	>	?		
		HIGH ORDER X AND Y									

1.9.4.5.2 ASCII Code Chart

Use Table 1-5 to convert ASCII code values to seven-bit binary values.

TABLE 1-5
ASCII CODE CHART

BITS	000	001	010	011	100	101	110	111
	CONTROL		HI X & Y GRAPHIC INPUT		LOW X		LOW Y	
0000	NUL 0	DLE 16	SP 32	0 48	@ 64	P 80	' 96	p 112
0001	SOH 1	DC1 17	! 33	1 49	A 65	Q 81	a 97	q 113
0010	STX 2	DC2 18	" 34	2 50	B 66	R 82	b 98	r 114
0011	ETX 3	DC3 19	# 35	3 51	C 67	S 83	c 99	s 115
0100	EOT 4	DC4 20	\$ 36	4 52	D 68	T 84	d 100	t 116
0101	ENQ 5	NAK 21	% 37	5 53	E 69	U 85	e 101	u 117
0110	ACK 6	SYN 22	& 38	6 54	F 70	V 86	f 102	v 118
0111	BEL 7	ETB 23	' 39	7 55	G 71	W 87	g 103	w 119
1000	BS 8	CAN 24	(40	8 56	H 72	X 88	h 104	x 120
1001	HT 9	EM 25	) 41	9 57	I 73	Y 89	i 105	y 121
1010	LF 10	SUB 26	* 42	: 58	J 74	Z 90	j 106	z 122
1011	VT 11	ESC 27	+ 43	; 59	K 75	[91	k 107	{ 123
1100	FF 12	FS 28	, 44	< 60	L 76	\ 92	l 108	 124
1101	CR 13	GS 29	- 45	= 61	M 77	] 93	m 109	} 125
1110	SO 14	RS 30	. 46	> 62	N 78	^ 94	n 110	~ 126
1111	SI 15	US 31	/ 47	? 63	O 79	_ 95	o 111	DEL 127

NOTES: The decimal equivalent is listed below each character.

1.9.4.5.3 Control Characters

Control characters are coded signals which are sent back and forth between the computer, terminal, and accessory devices to control operation. Their use is relatively standard. The control characters, their keyboard equivalent, and their effect upon the basic Tektronix 4014 terminal are listed in Table 1-6. (Table 1-6 is a summary of the Tektronix 4014 terminal control characters. The listing in this manual is included for your convenience, and is intended to serve as a quick reference guide to 4014 terminal control characters. Details concerning the use of the control characters are explained in your 4014 terminal owner's manual.)

NOTE

Keying control characters from the keyboard requires two (and in some cases three) key closures. In Table 1-6, "CTRL" followed by a letter character indicates that the control character is formed by first pressing the CTRL key and then the indicated letter key. "CTRL SHIFT" indicates the control character is formed by first pressing the CTRL and SHIFT keys and then pressing the indicated letter key.

TABLE 1-6
4014 TERMINAL CONTROL CHARACTERS

CONTROL	KEYBOARD INPUT	EFFECT UPON TERMINAL
ACK BEL BS	CTRL F CTRL G BACKSPACE or CTRL H	Ring bell, clear Bypass. Backspace, clear Bypass.
CAN	CTRL X	When sent after ESC, Bypass is selected to inhibit terminal response to echoed data.
CR	RETURN or CTRL M	Carriage return. Resets terminal from graphic to alpha mode, cancels crosshair cursor, undefined margin (full page), clears Bypass.
DC1 DC2 DC3 DC4 DLE EM ENQ	CTRL Q CTRL R CTRL S CTRL T CTRL P CTRL Y CTRL E	NOTE If sent after ESC, any subsequent CR is ignored. (Used to inhibit terminal response to a CR.) To enable CR, send BEL (or other non-operative control character). If sent after ESC, Bypass is enabled with one of the following GIN modes: 1. If in alpha mode, sends terminal status and lower left corner address. 2. If in graphic mode, sends terminal status and display beam address. Sending ESC ENQ, then hard copy request causes a terminal response after copy is complete.
EOT ESC	CTRL D ESC or CTRL K	When sent first, enables ENQ, ETB, FF, SI, SO, SUB. Also refer to Table 1-7.

TABLE 1-6
4014 TERMINAL CONTROL CHARACTERS (continued)

CONTROL	KEYBOARD INPUT	EFFECT UPON TERMINAL
ETB	CTRL W	If sent after ESC, generates a Make Copy signal to print hard copy of the terminal if a Hard Copy Unit is attached. ESC ETB also clears Bypass. Not effective if crosshair cursor is displayed.
ETX FF	CTRL C CTRL L	If sent after ESC, screen is erased, alpha mode is selected, cursor is sent to home, margin 1 is set, Bypass is cleared.
FS	CTRL SHIFT L	Used with enhanced graphic mode. Refer to Appendix F in 4014 owner's manual.
GS HT	CTRL SHIFT M TAB or CTRL I	Sets terminal to graphic mode, sets dark vector. Moves one space to the right, clears Bypass. Spacing past line end causes an automatic line feed and carriage return.
LF	LF or CTRL J	Moves cursor down one line. Moving past screen bottom causes cursor to wrap to top of screen in the alternate margin and clears Bypass. Also, refer to margin control switch description for further effects of moving past the bottom of the screen. ESC LF has the same effect as CR.
NAK NUL RS	CTRL U CTRL SHIFT P CTRL SHIFT N	Used with enhanced graphic mode. Refer to Appendix F in 4014 owner's manual.
SI	CTRL O	If sent after ESC, ASCII character set is selected (character set select switch is set to PROGRAM SELECT).
SO	CTRL N	If sent after ESC, alternate character set is selected (character set select switch is set to PROGRAM SELECT and alternate character set ROM installed).
SOH STX SUB	CTRL A CTRL B CTRL Z	If sent after ESC, sets GIN mode, starts crosshair cursor, clears graphic mode, activates Bypass.
SYN US	CTRL V CTRL SHIFT O	Resets terminal from graphic to alpha mode, clears Bypass.
VT	CTRL K	Reverse line feed, clears Bypass.

1.9.4.5.4 Other ESC Sequences:

The ESC sequences listed in Table 1-7 are followed by some character other than a control character. These ESC sequences are used for

controlling the character size and display writing characteristics. (Character size control for the plotter is explained in paragraph 1.9.4.4.6.)

TABLE 1-7
OTHER ESCAPE SEQUENCES

ESCAPE SEQUENCE	EFFECT UPON TERMINAL
ESC 8	Selects 74 characters, 35 lines.
ESC 9	Selects 81 characters, 38 lines.
ESC :	Selects 121 characters, 58 lines.
ESC ;	Selects 133 characters, 64 lines.

SECTION 2 OPERATION

2.1 THE CONTROL PANEL

The plotter's control panel consists of 12 membrane (switch) buttons and four LED indicators. The buttons are arranged in three rows with each row consisting of four buttons (see Figure 2-1).

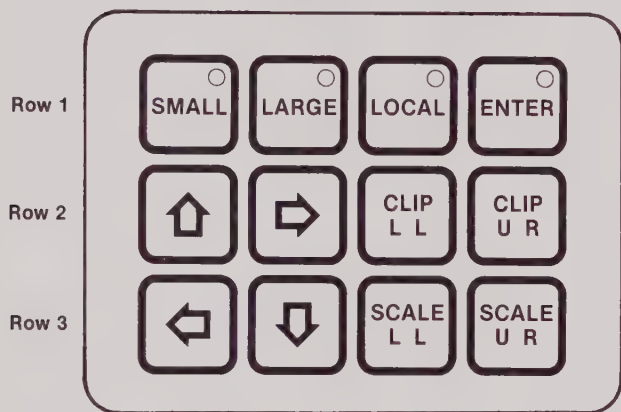


FIGURE 2-1
THE CONTROL PANEL

The LARGE and SMALL buttons in Row One are used to change the chart format and to manually reset the plotter. The other two buttons in Row One are used to place the plotter in one of its four operating modes—STATE 0, STATE 1, STATE 2, or STATE 3. The current mode of the plotter determines the functions of the buttons in Row Two and Row Three. The four operating modes and the functions of the remaining buttons are explained in the following paragraphs.

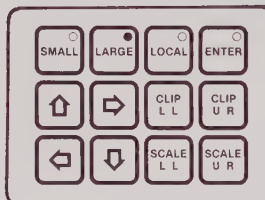
Each button in Row One has a LED indicator that will illuminate when its function is activated. When its function is deactivated, the LED indicator will turn off.

NOTE

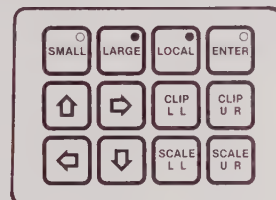
Illustrations similar to Figure 2-1 are referred to throughout this section. In these drawings, the symbol “●” specifies an activated (on) LED indicator and the symbol “○” specifies a deactivated (off) LED.

REFERENCE GUIDE FOR EACH OPERATING STATE (Each example has LARGE chart selected.)

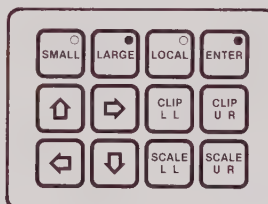
STATE 0
Remote operation.
(LOCAL and ENTER indicators are both OFF.)



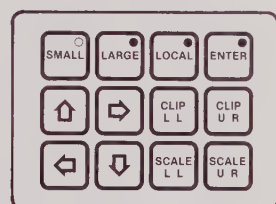
STATE 1
Local (manual) Operation.
(LOCAL indicator ON; ENTER indicator OFF.)



STATE 2
Baud Rate Select/Pen Change Enable.
(LOCAL indicator OFF; ENTER indicator ON.)



STATE 3
Window (Clip) and Scale Box Limits.
(LOCAL and ENTER indicators are both ON.)



2.2 CHART FORMAT/MANUAL RESET

As stated in paragraph 1.7, one of the functions of the LARGE and SMALL buttons is to change the chart format of the plotter. If large paper (22 × 34 inch for the DMP-41, 23.39 × 33.11 inch or 24 × 36 inch for the DMP-42) is to be used, the LARGE button must be pressed. If small paper (17 × 22 inch for the DMP-41, or 16.54 × 23.39 inch for the DMP-42) is to be used, the SMALL button must be pressed.

The plotter has two types of reset—cold reset and warm reset. The control panel LARGE and SMALL switches are used to reset the plotter. A cold reset occurs if the present chart format is changed, for example, by pressing the SMALL switch while in large format, or pressing the LARGE switch while in small format. A warm reset occurs if either switch is pressed, but the present format is not changed, such as pressing the SMALL switch while in small format, or pressing the LARGE switch while in large format. Table 2-1 lists the default values for each type of reset.

TABLE 2-1
COLD/WARM RESET DEFAULT VALUES

VALUE/FUNCTION	COLD RESET	WARM RESET
HANDSHAKE/INTERFACE		
deselect	X	X
clear buffer	X	X
STATE 0 (remote mode)	X	X
2400 baud	X	O
send XON	X	X
PAPER POSITION		
move to load position	X	X
shuffle paper	X	X
COORDINATE SYSTEM		
0.005 inch resolution	X	O
maximum window/scale box	X	X
TEXT		
pen change enable function	X	O
character set 0 (ASCII)	X	X
horizontal text path	X	X
character size #8 (0.063 inch)	X	X
italics off	X	X
maximum velocity (3 ips)	X	X

NOTES:

1. X = the listed value/function will become active and the present modification (if any) will be lost.
2. O = modifications (if any) to the listed value/function will remain (no change).

CAUTION

When using the POWER switch to reset the plotter manually (ON to OFF to ON), wait at least five seconds before powering back on. Otherwise, the plotter may jam (all LEDs on and the plotter does not respond to the control panel switches). If a jam occurs, power off the plotter for at least five seconds to restore normal operation.

2.3 STATE 0 MODE



The plotter automatically enters STATE 0 when the chart paper format is changed or the plotter is manually reset (see paragraph 2.2). The indicators on the LOCAL and ENTER buttons are turned off when the plotter is operating in STATE 0.

2.3.1 Remote Operation

STATE 0 enables your computer to communicate with the plotter and allows you to control all plotting activity with the software commands in the DM/PL protocol (see your DM/PL manual). The DM/PL Plotter Select (;) command initiates the communication link between the computer and the plotter. The plotter will continue to operate under computer control until it is manually reset or receives a DM/PL Deselect (@) or Reset (Z) command.

The functions of the buttons in row two and row three of the control panel are disabled when the plotter is operating in STATE 0.

2.4 STATE 1 MODE



STATE 1 mode allows the plotter to be controlled locally from the control panel buttons. STATE 1 is

initiated by first placing the plotter in STATE 0 (LOCAL and ENTER indicators off) and then pressing LOCAL. (The LOCAL indicator will illuminate.) To exit the plotter from STATE 1 and return it to STATE 0 (remote control), press LOCAL. (The LOCAL indicator will turn off.)

2.4.1 Local Operation

When the plotter is placed in STATE 1 (which enables local operation) plotting activity can be manually controlled from the control panel buttons. Manual operation of the plotter is explained below.



When this button is pressed and held, the paper is driven toward the rear of the plotter. To stop the paper drive, release the button.



When this button is pressed and held, the paper is driven toward the front of the plotter. To stop the paper drive, release the button.



When this button is pressed and held, the pen is driven across the beam to the right. The pen will stop at the end of the beam or when the button is released.



When this button is pressed and held, the pen is driven across the beam to the left. The pen will stop at the end of the beam or when the button is released.



When this button is pressed and released, the pen moves to the current lower left corner of the window (see paragraph 2.6.1).



When this button is pressed and released, the pen moves to the current upper right corner of the window.



When this button is pressed and released, the pen moves to the current lower left corner of the scale Box (see paragraph 2.6.1).



When this button is pressed and released, the pen moves to the current upper right corner of the scale Box.

The pen's up/down status will change when the LOCAL button is pressed and held and the ENTER button is pressed.



When these two buttons are pressed simultaneously, the plotter will perform the Self-Test routine (see paragraph 2.4.2).



To exit STATE 1 and return to STATE 0, press LOCAL.

2.4.2 Self-Test

The Self-Test routine is an off-line (local) performance check of the plotter's logic circuitry and mechanics. The Self-Test program is stored in the plotter's read-only-memory (ROM) and can be initiated manually or from your computer. The Self-Test program instructs the plotter to simulate an actual remote plotting session and checks for logic and mechanical malfunctions during its execution. The plotter's logic circuitry (ROM, RAM, buffer, etc.) is tested first. If the ROM test fails, the ENTER indicator LED will remain on. If the RAM test fails, the LOCAL indicator LED will remain on. In the case of a ROM or a RAM failure, further operation of the plotter is inhibited. The plotter also performs a mechanical performance test, which is called the Self-Test plot. The Self-Test plot consists of different alphanumeric characters and symbols. The plotter's operating configuration, such as baud rate and resolution settings, ROM REVISION numbers, etc., are also included in the plot. Figure 2-2 illustrates the Self-Test plot design.

The following paragraphs describe the areas of interest of the test plot.

- ROM REVISION DATA (REV.) This line provides information concerning the ROMs installed in the plotter.
- MODEL NUMBER (DMP#) records the model number of the plotter. It must be DMP41 for a model DMP-41 plotter. It must be DMP42 for a model DMP-42 plotter. If this number is wrong, then the printed circuit board in the plotter is configured incorrectly.

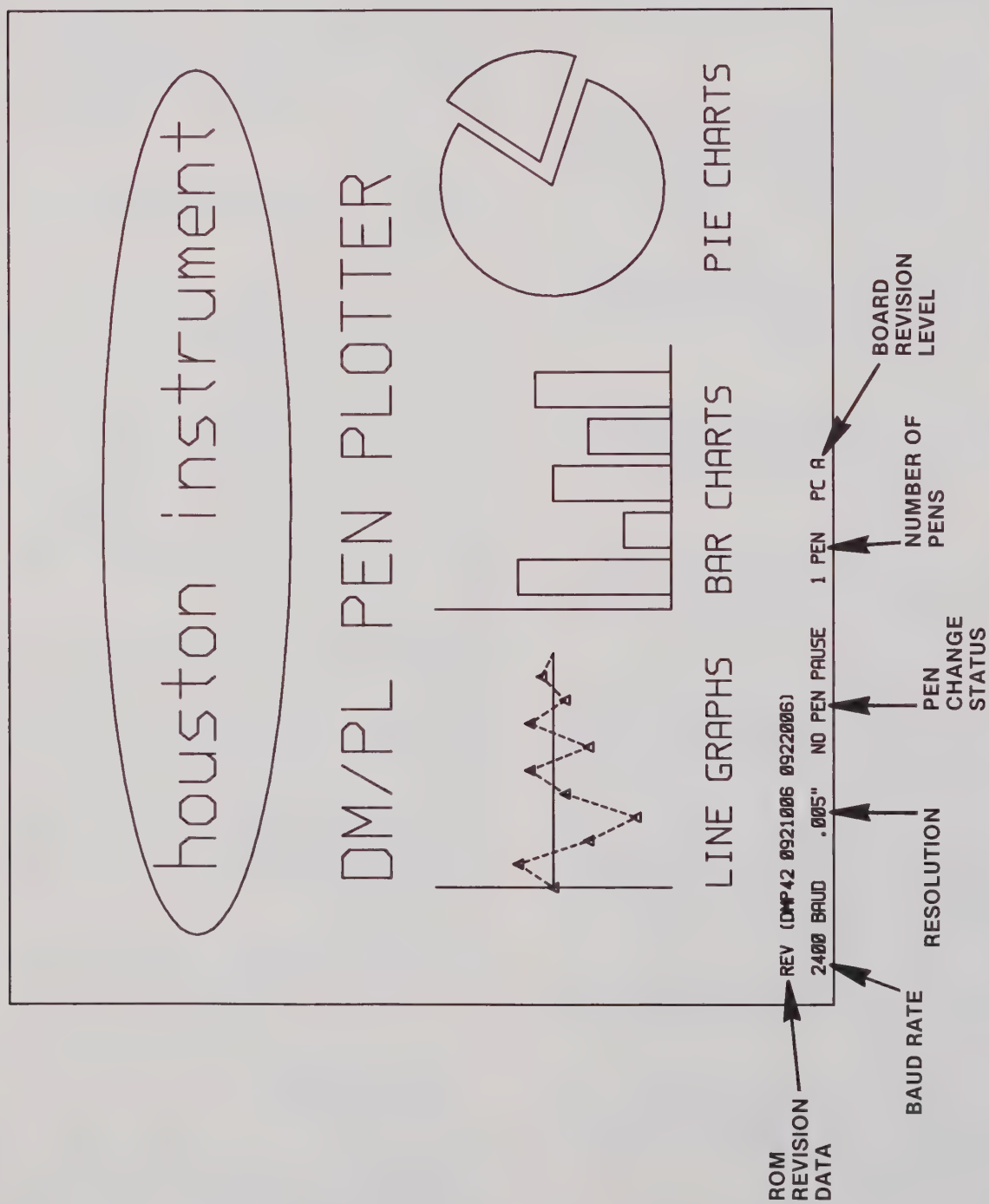


FIGURE 2-2
SELF TEST PLOT DESIGN

- ROM U9 DATA and ROM U10 DATA (0921006/0922006) are seven-digit codes for the ROMs installed. The ROM U9 DATA number describes ROM U9 on the printed circuit board, while the ROM U10 DATA number describes ROM U10. The first four digits are the ROM part number. The last three digits are the ROM revision level. For example, 0921006 indicates that ROM U9 is part number MW-921 at revision level 006. (Refer to paragraph 5.3 for a description of the ROM sets used.)

NOTE

The part numbers or revision levels of the ROMs used in your plotter may differ from those shown in this example.

- BAUD RATE (2400 BAUD) indicates the baud rate presently in effect for the plotter. The default value is 2400 baud. Other values can be selected using the control panel.
- RESOLUTION (0.005 inch) indicates the resolution presently in effect for the plotter. The default value is 0.005 inch. Other values (0.001 inch or 0.1 mm) can be selected using the Coordinate Addressing (EC) command (see your DM/PL manual).
- PEN CHANGE STATUS (NO PEN PAUSE) indicates how the plotter responds to New Pen (P) commands (see your DM/PL manual). The default value is to ignore these commands. The control panel can be used to alter the plotter configuration so that it stops upon receipt of a New Pen (P) command. The pen change status will then be "PEN PAUSE" when the test plot is printed.
- NUMBER OF PENS (1 PEN) indicates the number of pens used in the plotter's pen holder.

- BOARD REVISION LEVEL (PC A) indicates the revision level of the printed circuit (PC) board used in the plotter.

NOTE

The revision level of the board used in your plotter may differ from that shown in this example.

- The remainder of the test plot must be exactly as shown.

NOTE

The Self-Test routine resets the plotter to the default operating level. The default values are listed in paragraph 2.2.

There are two methods for initiating the Self-Test—locally and remotely. To initiate it locally, press the control panel LOCAL switch once to enable local mode (LOCAL LED on). Then simultaneously press the control panel ↑ and ↓ switches. To initiate it remotely, press the control panel LOCAL switch once to enable remote mode (LOCAL LED off). Then send the DM/PL plotter Test command (;:T) to start the test. (Refer to your DM/PL manual).

2.5 STATE 2 MODE



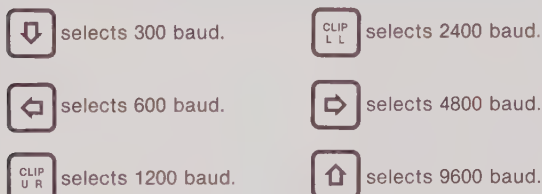
The plotter must be entered into STATE 2 mode from STATE 0. To activate STATE 2 mode, first place the plotter in STATE 0, and then press ENTER. (The ENTER indicator will illuminate.)

After the plotter is placed in STATE 2, the buttons in row two and row three of the control panel can be used to change the plotter's baud rate and to activate the pen change enable function. (The pen change function enables you to create multi-colored plots and graphs with your software programs.)

2.5.1 Baud Rate Select

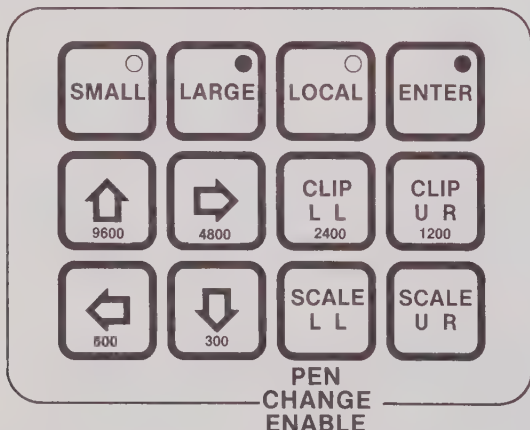
The plotter will operate at either 300, 600, 1200, 2400, 4800, or 9600 baud. The plotter automatically selects 2400 baud for operation at

power up. To change the plotter's baud rate, place the plotter in STATE 2, and then press the corresponding control panel button for the baud rates listed below. After a baud rate selection is made, the rate will remain in effect until the plotter is powered down or a new baud rate is specified. The plotter will return to STATE 0 after an entry is made.



2.5.2 Pen Change Enable

The pen change enable feature allows you to create multi-colored plots and graphs with your DM/PL software programs. When this function is activated, the plotter will scan your software programs for DM/PL New Pen (P) commands. (The DM/PL protocol is explained in your DM/PL manual.) If a New Pen (P) command is received, the plotter will switch to STATE 1 (local) and stop. After changing the the pen to the color you want, press LOCAL and the plotter will resume processing the program.

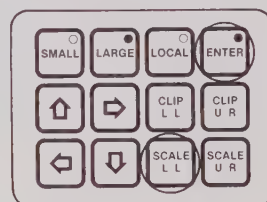


To activate pen change enable, place the plotter in STATE 2 and then press SCALE LL. The plotter will automatically return to STATE 0 and the pen change enable function will remain in effect until the plotter is powered down.

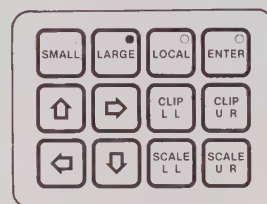
When the pen change enable function is not activated, the plotter will ignore all New Pen (P) commands that are transmitted from the computer.

The following procedure illustrates how to activate the pen change enable function and respond to New Pen (P) commands.

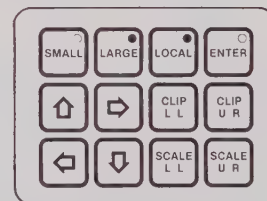
1. To activate pen change enable, first press ENTER, and then press SCALL LL. (The plotter will automatically return to STATE 0 after SCALL LL is pressed.)



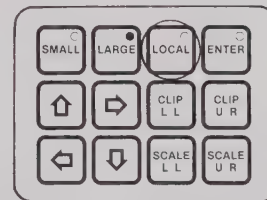
2. With the plotter in STATE 0, a program containing New Pen (P) commands is transmitted from the computer.



3. The plotter processes the program until it receives the first New Pen (P) command, at which time it enters STATE 1 and waits for you to change the pen.



4. After you install the new pen, press LOCAL and the plotter will return to STATE 0 and continue to process the program until it receives the next New Pen (P) command.



2.6 STATE 3 Mode



STATE 3 allows new window (Clip) and scale box limits to be specified. To place the plotter in this mode, you must first specify STATE 1 (press and

release LOCAL) and then specify STATE 3 by pressing and releasing ENTER. (The LOCAL and ENTER indicators will illuminate.)

The plotter automatically returns to STATE 1 when a new limit is specified. If an error was made when specifying a limit, the plotter will return to STATE 1 and the ENTER LED indicator will blink on and off. If this condition occurs, press ENTER and specify the limits again.

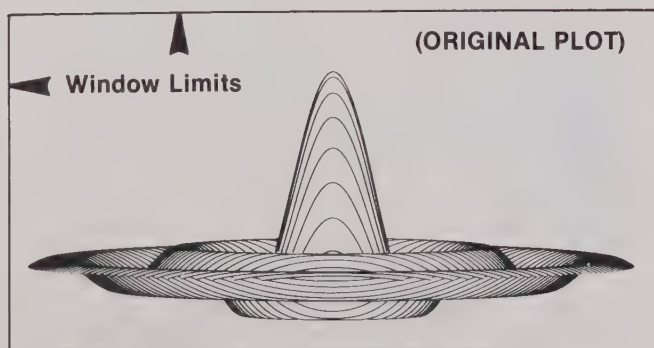
After the limits have been set, return the plotter to STATE 0 by pressing LOCAL. (The LOCAL and ENTER indicators are both off when the plotter is in STATE 0.)

2.6.1 The Window (Clip) and Scale Functions

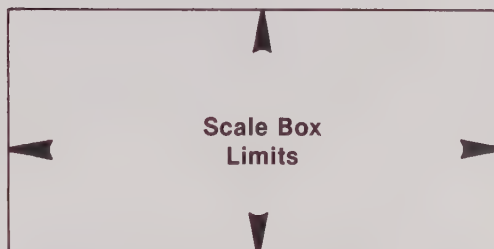
As you become more familiar with your plotter, and the complexity of your plots increases, you will discover many useful applications for the plotter's window and scaling capabilities. These functions enable you to change the size and aspect of a graphic design and then reproduce it anywhere on a plot or a new sheet of paper.

First, let's define a window, a scale box, and the viewport area. The window is used to "show" the plotter which plot design, or particular portion (clip) of a design, that you want reproduced. The scale box function is used to "tell" the plotter what size and aspect you want the window plot to be when it is reproduced. The outer edges of the rectangular window and scale box areas are called "limits." The viewport is simply the area on the paper where you want the plot to be drawn. These three functions are better illustrated below.

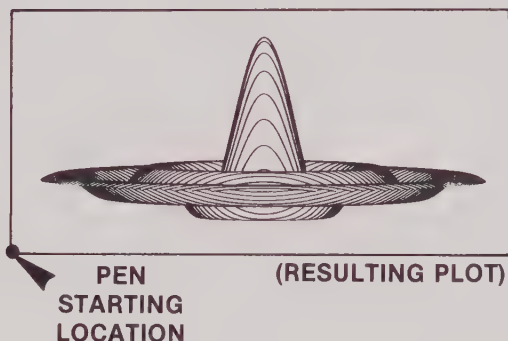
The window rectangle shows the plotter **WHAT** to reproduce.



The scale box rectangle shows the plotter **HOW MUCH** to enlarge or reduce the design in the window.



The viewport area shows the plotter **WHERE** to reproduce the plot design.



The window provides the plotter with clipping capabilities. In plotter terminology, clipping is the ability to select a small part of a complete plot design for reproduction. When the plotter is commanded to draw a clip from a plot design or during the actual processing of the clip, the pen may pause for various lengths of time. The reason for the pause is that when window limits are specified, the plotter will still receive the plot codes for the entire plot design but will draw only the data for the plot that was placed inside the limits. If the data for the window plot is not at the beginning of the software program, the pen will pause until that portion of the program is received by the plotter. If the plotter is processing window data and receives plot codes that require the pen to travel outside the limits, the pen will process up to the limit and pause. The pen will resume processing when the plotter receives additional window data.

If the plotter is reset (LARGE/SMALL) or powered down, the window and scale box limits default to the entire plotting area of the paper.

CAUTION

When using the POWER switch to reset the plotter manually (ON to OFF to ON), be sure to wait at least five seconds before powering back on. Otherwise, the plotter may jam (all LEDs on and the plotter does not respond to the control panel switches). If a jam occurs, power off the plotter for at least five seconds to restore normal operation.

NOTE

Window and scale functions can only be canceled by using a Set Window/Viewport Limits Command (W) or by powering the plotter off (for at least five seconds) then on.

It is important to note that when the limits for the scale box rectangle are set in exact proportion to the limits of the window rectangle, then the plot will not change in aspect when it is reproduced. However, if the scale box rectangle is not exactly proportional to the window rectangle, a change in aspect will occur. For instance, if you set a 2×4 inch window rectangle around a circle design and then set your scale box rectangle as 4×8 inch, the plotter will draw a circle approximately twice the size of the one that is in the window (see Figure 2-3). The aspect of the circle will not

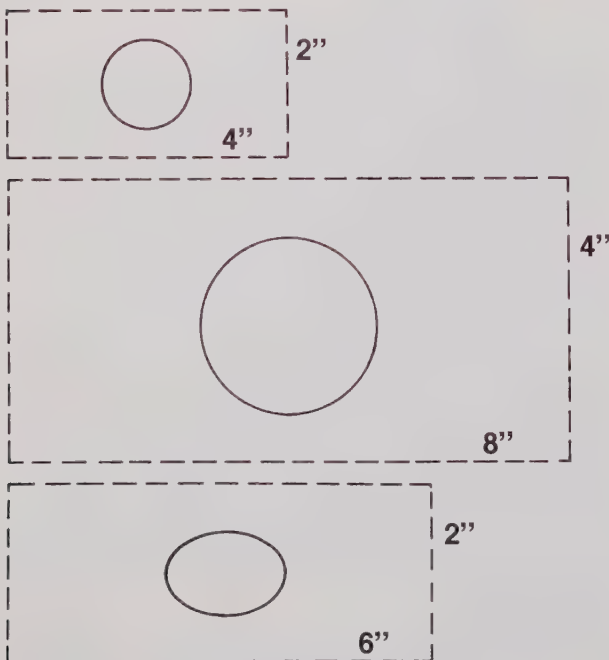


FIGURE 2-3
DIFFERENCES IN ASPECT RATIO

change because the size of the two rectangles are exactly proportional. If you were to change the size of the scale box rectangle to 2×6 inch, the plotter would produce an ellipse rather than a circle because the scale box rectangle (2×6 inch) is not exactly proportional to the 2×4 inch window.

The scale or the window can be changed to any size by moving only two points—the lower left corner point and the upper right corner point of the rectangle. This is illustrated in Figure 2-4. Moving the Lower Left (LL) corner point or the Upper Right (UR) corner point of the window or scale box rectangle will change its size.

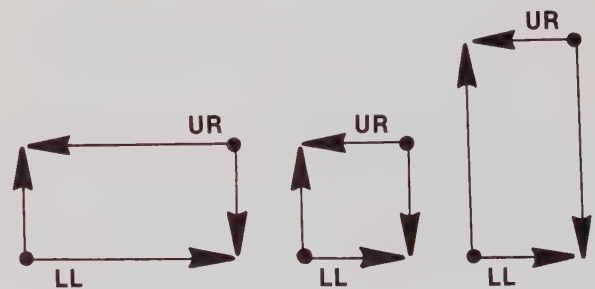


FIGURE 2-4
SCALE AND WINDOW SIZING

The viewport area does not require set limits as do the window and the scale box functions. The viewport is simply the area where you want the plotter to draw the window/scale box design. (This area will always be the same size as the current scale box.)

The viewport area must be manually selected with the position of the pen. To select a viewport area, move the pen with the manual movement keys (the switches with the arrow symbols: ↑, ↓, ←, →) to a point BELOW and TO THE LEFT OF which you want the design to appear. (When moving the pen around the paper, visualize the pen as being the lower left corner of the scale box rectangle. When the plotter is commanded to draw the design, it will reproduce the plot at the size of the scale box rectangle above and to the right of the current position of the pen.)

NOTE

Do not reset the plotter until after it has reproduced the plot design in the viewport area. Reset will cause the window and scale box rectangles to default to the entire plotting surface.

The default window (clip) and scale is the entire plotting area for large chart. If not otherwise clipped or scaled, the resulting plot is at a 1:1 ratio. If the plotter is switched to small chart format, it treats the small chart as a window on the large chart's default window and scale. This can result in loss of plot data if the plot extends beyond the small chart's area. (The data on the small chart is at a 1:1 ratio, not proportionally scaled to fit.) This effect is illustrated below. The original plot is a star on large chart format. If the plotter is switched to small chart without scaling or a window and it is started at the same viewport location, a partial plot will result as shown.

NOTE

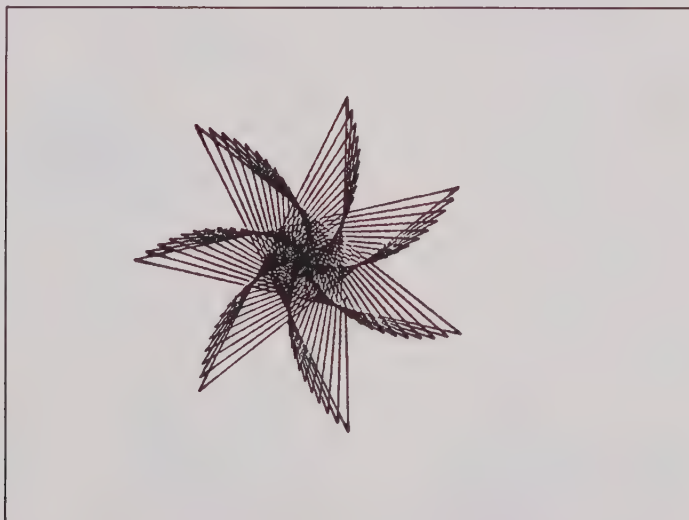
Window and scale functions can only be canceled by using a Set Window/Viewport Limits Command (W) or by powering the plotter off (for at least five seconds) then on.

2.6.2 Auto Windowing (Clipping)

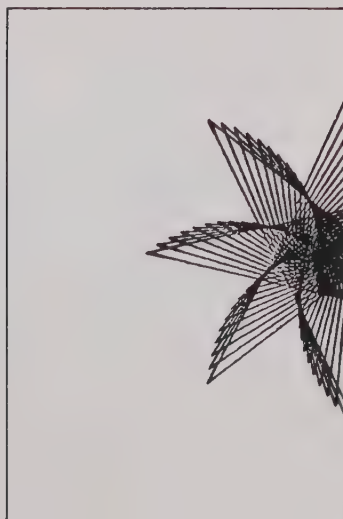
The auto clipping (windowing) feature allows the user to set a window for the plot. This results in only the data within the window being plotted (the plot is "clipped"). The window requires that a lower left point and an upper right point be set for proper operation.

NOTE

The Auto Clipping function can only be canceled by using a Set Window/Viewport Limits Command (W) or by powering the plotter off (for at least five seconds) then on.



**ORIGINAL PLOT
(LARGE CHART FORMAT)**



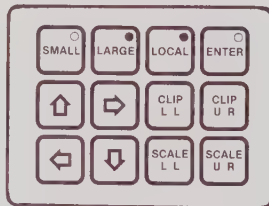
**RESULTING PLOT
(SMALL CHART FORMAT)**

CLIP LL on the control panel is used to set new lower left corner points for the window and CLIP UR is used to set new upper right corner points. The following procedure explains how to set new corner points for the window using these control panel functions.

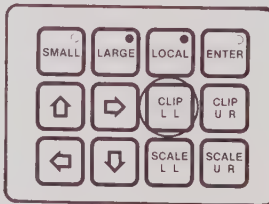
1. Before changing the limits, see where the present window limits are located. Place the plotter in STATE 1 and then press the CLIP LL button on the control panel. The pen will move to the lower left corner of the current window. Next, press the CLIP UR button on the control panel. The pen will move to the upper right corner of the current window. (The pen travels the outline of the window rectangle as it moves from corner to corner.

CLIP UR to move the pen to the current upper right corner of the window. Use the manual movement keys to move the pen to a new upper right corner location. After the pen is positioned, place the plotter in STATE 3 by pressing ENTER. With the plotter in STATE 3, press CLIP UR. The plotter will register the current position of the pen as the new upper right corner for the window and will then return to STATE 1. The new corner points for the window can be checked by repeating step one.

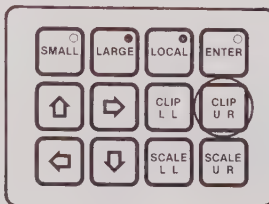
a) Place the Plotter in STATE 1.



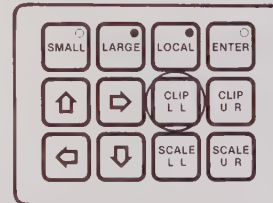
b) Pen moves to current lower left (Window) corner when CLIP LL is pressed.



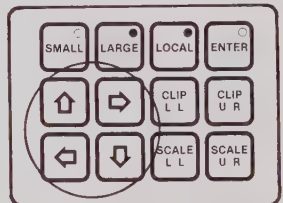
c) Pen moves to current upper right (Window) corner when CLIP UR is pressed.



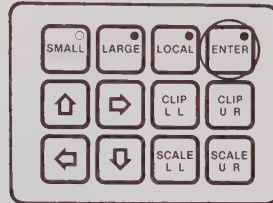
d) Press CLIP LL to move the Pen to the current lower left corner.



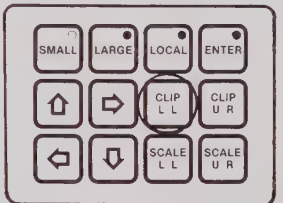
e) Use the MANUAL MOVEMENT KEYS to move the Pen to a new lower left corner point.



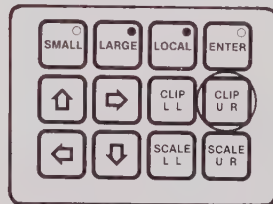
f) Place the Plotter in STATE 3 by pressing ENTER.



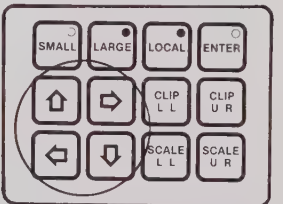
g) Press CLIP LL to register the new corner point.



h) Press CLIP UR to move the Pen to the current upper right corner.

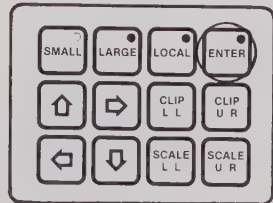


i) Use the MANUAL MOVEMENT KEYS to move the Pen to a new upper right corner point.

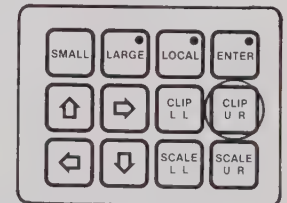


2. To change the window limits, move the pen back to the present lower left corner of the window by pressing CLIP LL. Use the manual movement keys to move the pen to a new lower left corner location. After the pen is positioned, place the plotter in STATE 3 by pressing ENTER. (The LOCAL and ENTER indicators are both on in STATE 3.) With the plotter in STATE 3, press CLIP LL. The plotter will register the current position of the pen as the new lower left corner for the window and will then return to STATE 1. Next, press

j) Place the Plotter in STATE 3 by pressing ENTER.



k) Press CLIP UR to register the new corner point.

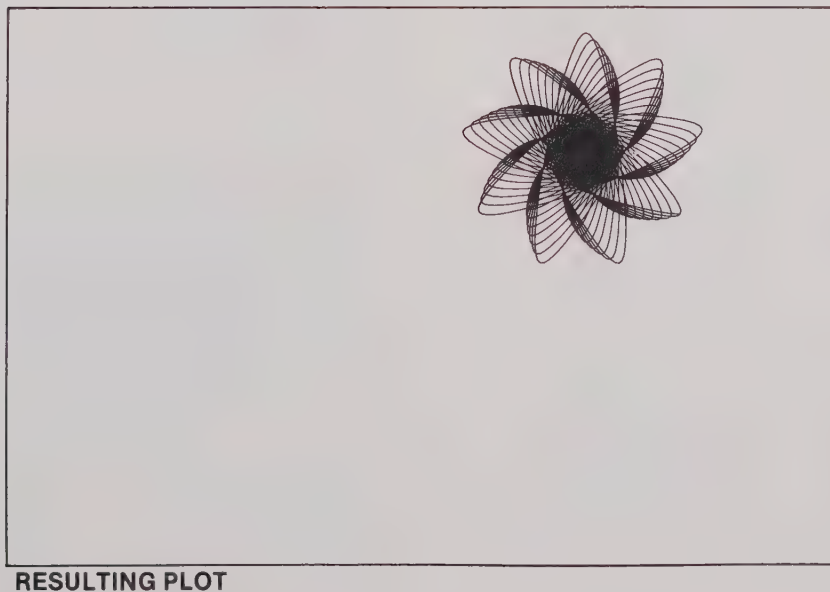
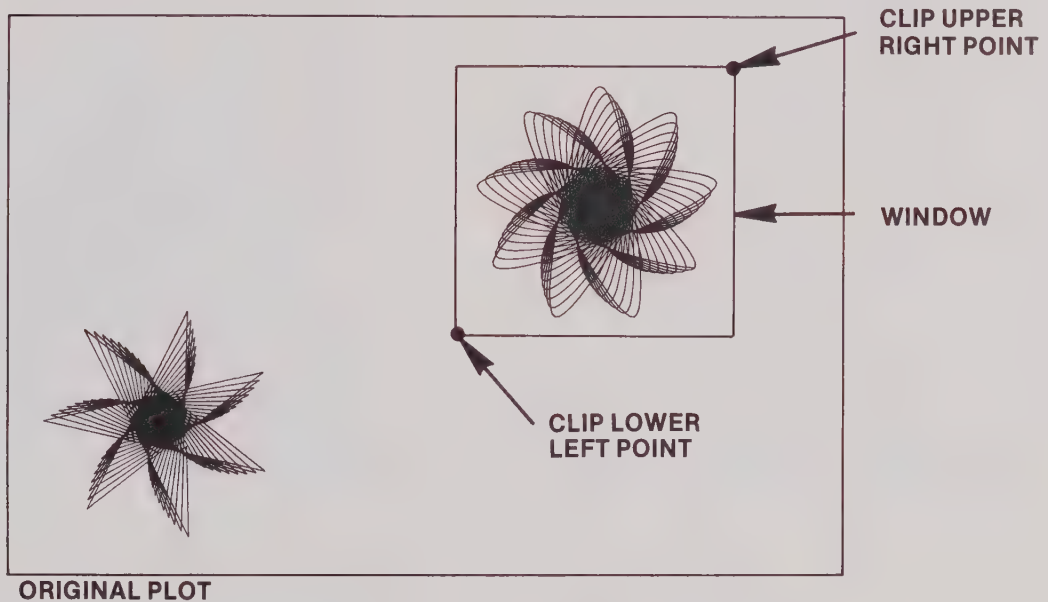


3. The window limits will remain in effect until:

- a. new limits are specified with the CLIP LL and CLIP UR control panel buttons, or
- b. new limits are specified with the DM/PL window and Viewport (W) command in a software program, or

- c. the plotter is powered down, which will cause the window to default to the entire plotting area, or
- d. a chart size format (LARGE/SMALL) is specified.

The following shows the results of setting a window (but not scaling). A window is set on the original plot as shown. The resulting plot will be clipped as shown.



2.6.3 Scaling

The scaling feature allows the user to shrink or enlarge a plot. Scaling can be used with or without a window. The entire plot will be affected if no window is set. If a window is set, only the data within the window is scaled.

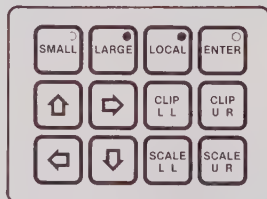
NOTE

The Scaling function can only be canceled by using a Set Window/Viewport Limits Command (W) or by powering the plotter off (for at least five seconds) then on.

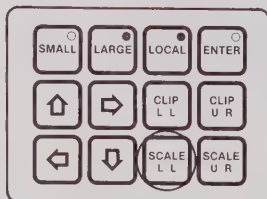
The procedure for changing the size of the scale box rectangle is the same as that for the window rectangle except the SCALE LL and SCALE UR are used instead of the CLIP LL and CLIP UR. The following procedure explains how to set the scale box limits.

- Before changing the limits, see where the present scale box limits are located. Place the plotter in STATE 1 and then press the SCALE LL button on the control panel. The pen will move to the lower left corner of the current scale box. Next, press the SCALE UR button on the control panel. The pen will move to the upper right corner of the current scale box. (The pen travels the outline of the scale box rectangle as it moves from corner to corner.)

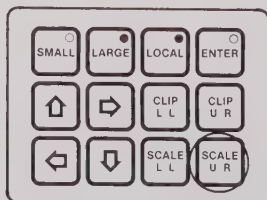
a) Place the Plotter in STATE 1.



b) The Pen moves to the current lower left corner of the Scale Box when SCALE LL is pressed.

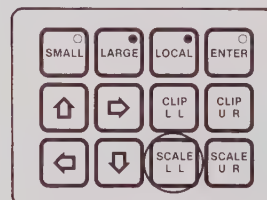


c) The Pen moves to the current upper right corner of the Scale Box when SCALE UR is pressed.

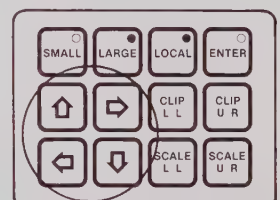


- To change the scale box limits, move the pen back to the present lower left corner of the

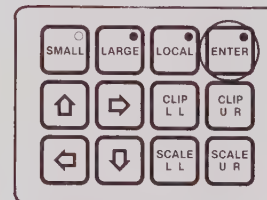
scale box by pressing SCALE LL. Use the manual movement keys to move the pen to a new lower left corner location. After the pen is positioned, place the plotter in STATE 3 by pressing ENTER. (The LOCAL and ENTER indicators are both on in STATE 3.) With the plotter in STATE 3, press SCALE LL. The plotter will register the current position of the pen as the new lower left corner for the scale box and will then return to STATE 1. Next, press SCALE UR to move the pen to the current upper right corner of the scale box. Use the manual movement keys to move the pen to a new upper right corner location. After the pen is positioned, place the plotter in STATE 3 by pressing ENTER. With the plotter in STATE 3, press SCALE UR. The plotter will register the current position of the pen as the new upper right corner for the scale box and will then return to STATE 1. The new corner points for the scale box can be checked by repeating step one.



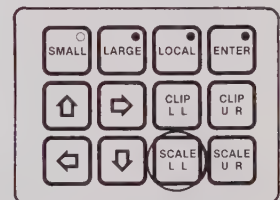
d) Press SCALE LL to move the Pen to the current lower left corner.



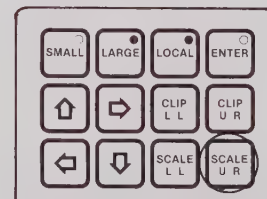
e) Use the MANUAL MOVEMENT KEYS to move the Pen to a new lower left corner point.



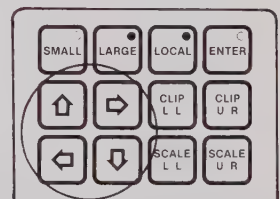
f) Place the Plotter in STATE 3 by pressing ENTER.



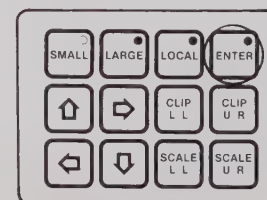
g) Press SCALE LL to register the new corner point.



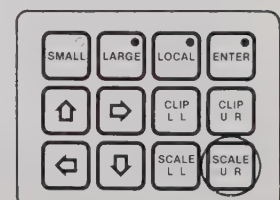
h) Press SCALE UR to move the Pen to the current upper right corner.



i) Use the MANUAL MOVEMENT KEYS to move the Pen to a new upper right corner point.



j) Place the Plotter in STATE 3 by pressing ENTER.

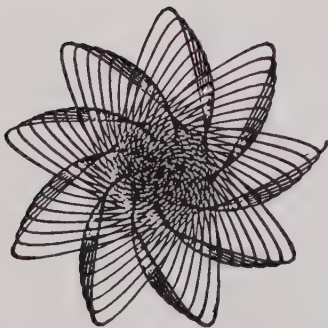
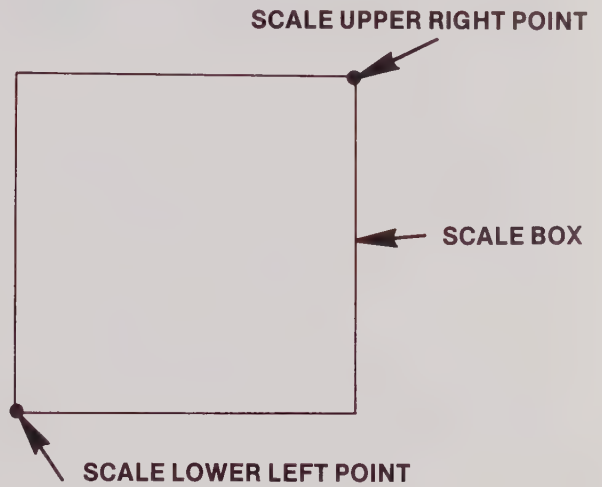
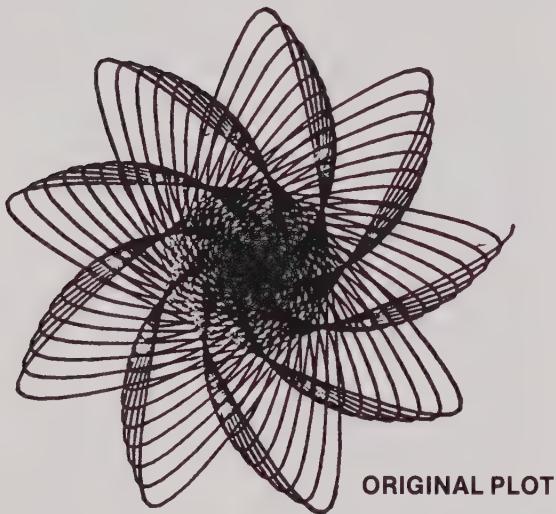


k) Press SCALE UR to register the new corner point.

3. The scale limits will remain in effect until:
- a. new limits are specified with the SCALE LL and SCALE UR control panel buttons, or
 - b. new limits are specified with the DM/PL Window and Viewport (W) command in a software program, or

- c. the plotter is powered down, which will cause the scale to default to the entire plotting area, or
- d. a chart size format (LARGE/SMALL) is specified.

The following shows the results of setting scaling (but not a window). Scaling is selected on the original plot as shown. The resulting plot will be reduced as shown.



RESULTING PLOT

2.6.4 Auto Aspect

The auto aspect feature allows the plotter to maintain the correct aspect of the plot when using scaling. This feature is useful in preventing unwanted distortion of a scaled plot. (Without auto aspect, you must make sure that the scale box is exactly proportioned to the original plot to prevent distortion.)

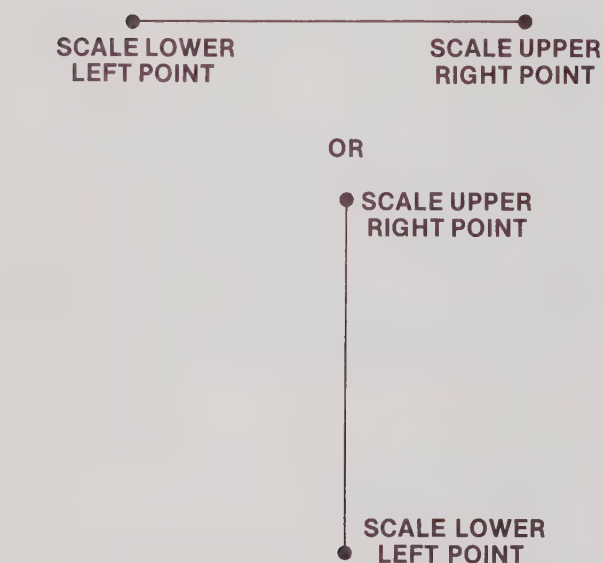
To select auto aspect, set both the scale lower left and the scale upper right points in the same plane as shown below. In effect, only the scale x

axis or only the scale y axis is given. The plotter will then automatically calculate the correct proportion for the missing axis.

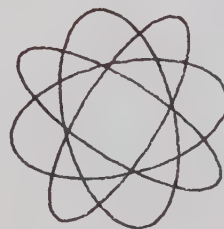
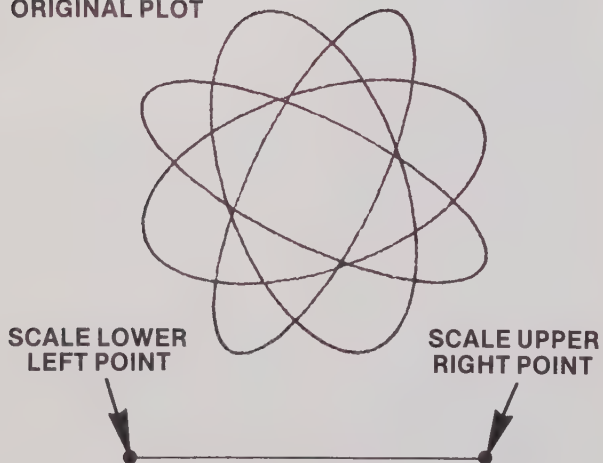
The following steps list the general method for selecting auto aspect for a plot.

1. Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
2. Use the manual controls to position the pen carriage to the desired scale lower left point.
3. Press the plotter ENTER switch once. Press the plotter SCALE LL switch once.
4. Use the manual controls and move the pen carriage **IN THE SAME PLANE** (x axis only or y axis only) as the scale lower left point. Stop when the pen has reached the distance that represents the desired scaling size. (For example, one half of the plot's x axis to select 50% scaling.)
5. Press the plotter ENTER switch once. Press the plotter SCALE UR switch once.
6. Press the plotter LOCAL switch once to select remote mode (SCALE LED off).

Following is an example of auto aspect. The first part shows a test plot made at full size on a small chart (no window or scale set). Auto aspect is then selected by entering the scale lower left and upper right points as shown. The resulting plot is then drawn at a reduced size with the correct proportions.



ORIGINAL PLOT



RESULTING PLOT

2.6.5 Exercises

The following paragraphs give a series of exercises for you to practice the scaling and windowing (clipping) features described previously in this section. These exercises use the self test plot so that you can obtain the same results.

Apply power to the plotter, load small chart paper, and install a pen in the pen holder as described in Section 1. You can then do the following exercises in any order.

2.6.5.1 Window Exercise

The following steps show how to set a window.

1. Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
2. Simultaneously press the plotter ↑ and ↓ switches to begin the test plot. Wait for the plotter to complete the test plot.
3. Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
4. Use the plotter manual controls and move the pen to the approximate location for the lower left point shown in Figure 2-5.
5. Press the plotter ENTER switch once, then press the CLIP LL switch once.
6. Use the plotter manual controls and move the pen to the approximate location for the upper right point shown in Figure 2-5.
7. Press the plotter ENTER switch once, then press the CLIP UR switch once.
8. Use the manual movement keys (←, ↑, ↓, →) to move the pen and the paper to load position. (Do not press the SMALL key or else the plotter will reset, causing the window limits that were specified earlier in this exercise to default to the entire plotting area.)
9. Insert a clean sheet of small chart paper or use the backside of the used sheet. Use the manual movement keys to move the pen to the vicinity of the clip lower left point shown in Figure 2-5.
10. Simultaneously press the ↑ and the ↓ switches to begin the test plot. (The plotter will pause before and during the plot.) Wait for the plotter to complete the test plot.

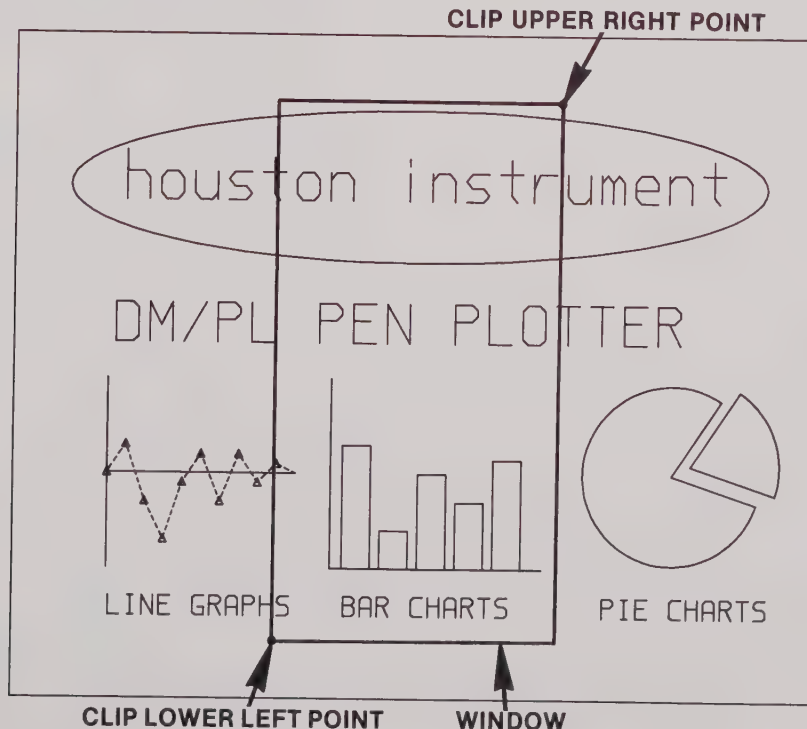


FIGURE 2-5
TEST PLOT WINDOW SET

- Note that the test plot is "clipped" as shown in Figure 2-6. The important thing to note is that only the data within the window was plotted.



**FIGURE 2-6
TEST PLOT RESULTING WINDOW**

2.6.5.2 Scale Exercise

The following steps show how to set scaling.

- Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
- Simultaneously press the plotter ↑ and ↓ switches to begin the test plot. Wait for the plotter to complete the test plot.
- Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
- Use the plotter manual controls and move the pen to the approximate location for the lower left point shown in Figure 2-7.
- Press the plotter ENTER switch once, then press the SCALE LL switch once.
- Use the plotter manual controls and move the pen to the approximate location for the upper right point shown in Figure 2-7.
- Press the plotter ENTER switch once, then press SCALE UR switch once.
- Use the manual movement keys (←, ↑, ↓, →) to move the pen and the paper to load position. (Do not press the SMALL key or else the plotter will reset, causing the scale

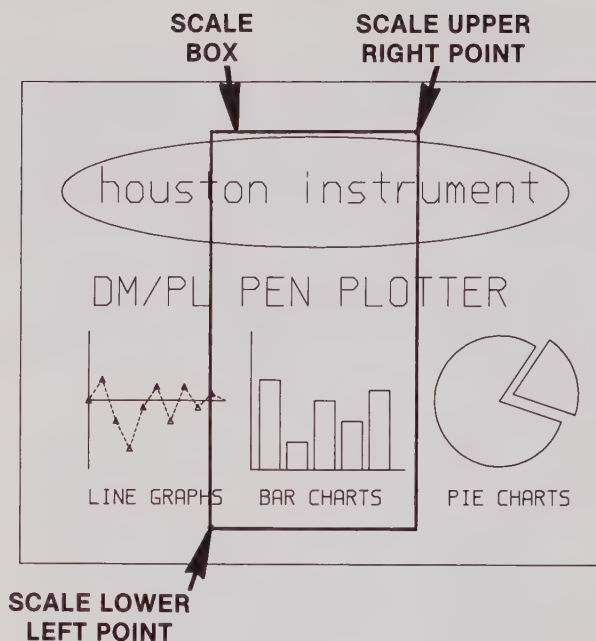


**FIGURE 2-7
TEST PLOT SCALE SET**

box limits that were specified earlier in this exercise to default to the entire plotting area.)

- Insert a clear sheet of small chart paper or use the backside of the used sheet. Use the manual movement keys to move the pen to the vicinity of the scale lower left point shown in Figure 2-7.
- Simultaneously press the ↑ and the ↓ switches to begin the test plot. (The plotter will pause before and during the plot.) Wait for the plotter to complete the test plot.

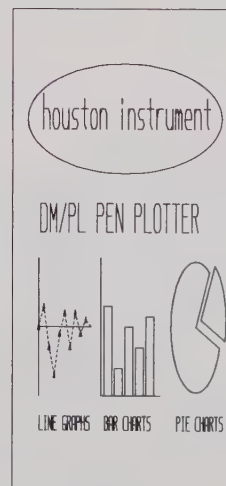


**FIGURE 2-8
TEST PLOT RESULTING SCALING**

11. Note that the test plot is scaled as shown in Figure 2-8. The important thing to note is that the entire plot has been scaled to fit within the scale box. The aspect is distorted since the proportions of the original plot were not used.

2.6.5.3 Auto Aspect Exercise

The following steps show how to set auto aspect.

1. Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
2. Simultaneously press the plotter ↑ and ↓ switches to begin the test plot. Wait for the plotter to complete the test plot.
3. Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
4. Use the plotter manual controls and move the pen to the approximate location for the lower left point shown in Figure 2-9.
5. Press the plotter ENTER switch once, then press the SCALE LL switch once.
6. Use the ↓ manual control and move the pen to the approximate location for the upper right point shown in Figure 2-9.
7. Press the plotter ENTER switch once, then press the SCALE UR switch once.
8. Use the manual movement keys (←, ↑, ↓, →) to move the pen and the paper to load position. (Do not press the SMALL key or else the plotter will reset, causing the scale box limits that were specified earlier in this exercise to default to the entire plotting area.)
9. Insert a clean sheet of small chart paper or use the backside of the used sheet. Use the manual movement keys to move the pen to the vicinity of the scale lower left point shown in Figure 2-7.
10. Simultaneously press the plotter ↑ and ↓ switches to begin the test plot. Wait for the plotter to complete the test plot.

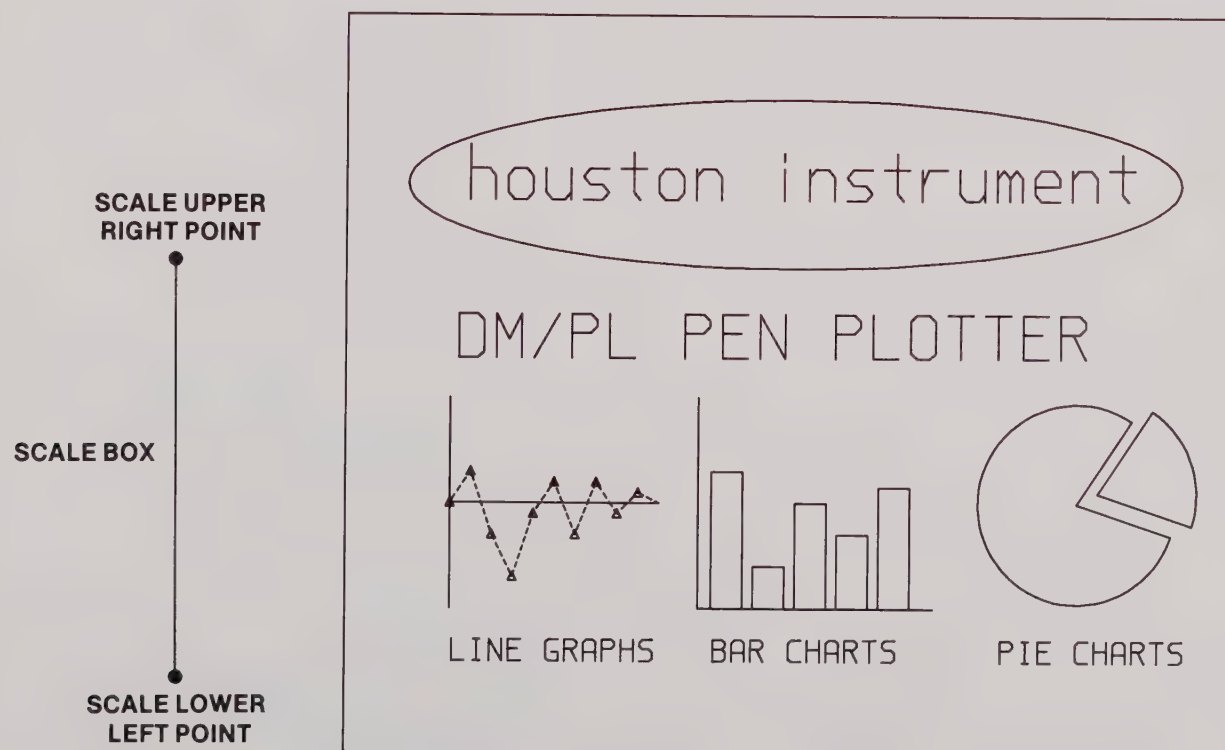


FIGURE 2-9
TEST PLOT AUTO ASPECT SET

11. Note that the test plot is scaled as shown in Figure 2-10. The important thing to note is that the entire plot has been scaled approximately 50%. The aspect is correct since the proportions of the original plot were used by the plotter to calculate the correct aspect ratio.

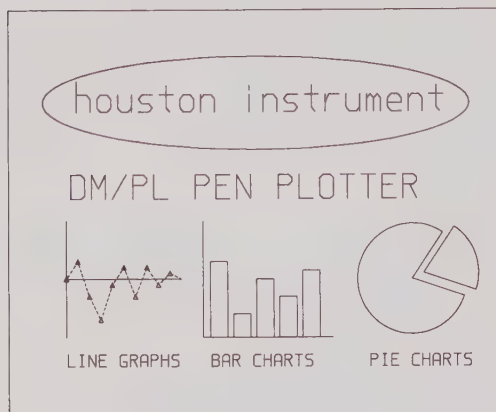


FIGURE 2-10
TEST PLOT RESULTING AUTO ASPECT

2.6.5.4 Window And Auto Aspect Exercise

The following steps show how the window and auto aspect features interact.

1. Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
2. Simultaneously press the plotter ↑ and ↓ switches to begin the test plot. Wait for the plotter to complete the test plot.
3. Press the plotter LOCAL switch once to select local mode (LOCAL LED on).
4. Use the plotter manual controls and move the pen to the approximate location for the window lower left point shown in Figure 2-11.
5. Press the plotter ENTER switch once, then press the CLIP LL switch once.
6. Use the plotter manual controls and move the pen to the approximate location for the window upper right point shown in Figure 2-11.
7. Press the plotter ENTER switch once, then press the CLIP UR switch once.
8. Use the plotter manual controls and move the pen to the approximate location for the scale lower left point shown in Figure 2-11.

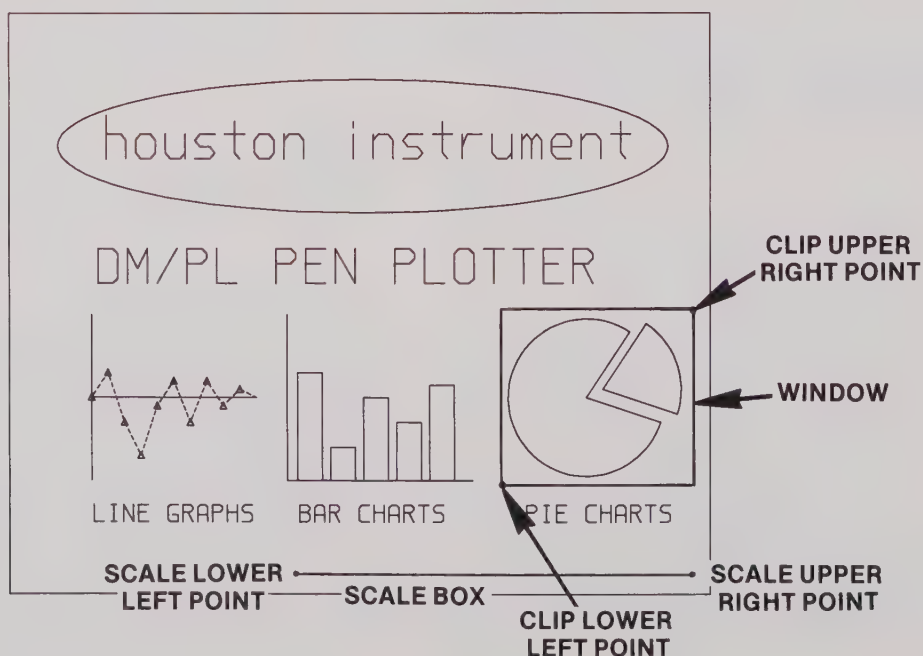


FIGURE 2-11
TEST PLOT WINDOW AND AUTO ASPECT SET

9. Press the plotter ENTER switch once, then press the SCALE LL switch once.
10. Use the plotter manual controls and move the pen to the approximate location for the scale upper right point shown in Figure 2-11.
11. Press the plotter ENTER switch once, then press the SCALE UR switch once.
12. Use the manual movement keys (←, ↑, ↓, →) to move the pen and the paper to the load position. (Do not press the SMALL key or else the plotter will reset, causing the scale box limits that were specified earlier in this exercise to default to the entire plotting area.)
13. Insert a clean sheet of small chart paper or use the backside of the used sheet. Use the manual movement keys to move the pen to the vicinity of the scale lower left point shown in Figure 2-11.
14. Simultaneously press the plotter ↑ and ↓ switches to begin the test plot. Wait for the plotter to complete the test plot.

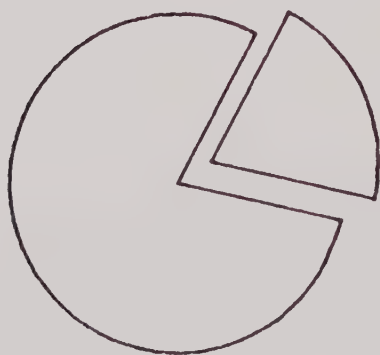


**FIGURE 2-12
TEST PLOT RESULTING
WINDOW AND AUTO ASPECT**

15. Note that the test plot is scaled as shown in Figure 2-12. The important thing to note is that the window data has been scaled approximately twice original size. The aspect is correct since the proportions of the original plot were used by the plotter to calculate the correct aspect ratio.

2.6.6 Final Exam

This is the final examination for the window, scaling, and viewport concepts learned in the previous paragraphs. To take this test, first study Figure 2-13. Then answer the following questions. There are no trick questions (or answers!). The correct answers are given in the next paragraph. Good luck.

A window is set at point B,
scaling is set at point C, and
the viewport is set at point D.

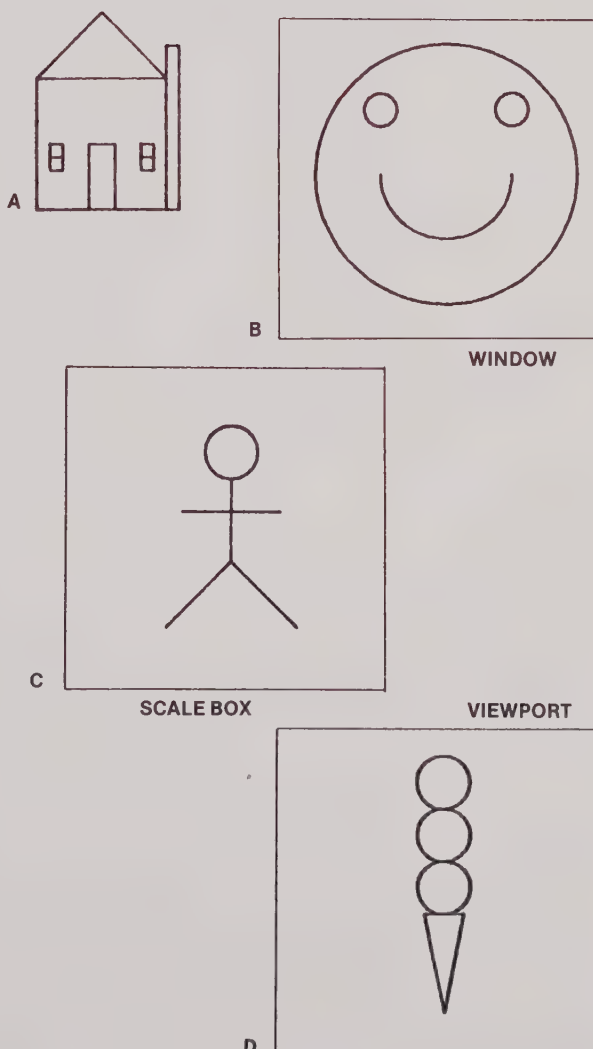


**FIGURE 2-13
FINAL EXAM PLOT**

If the plot is performed again on new paper,

- (1) Which picture will be plotted?
- (2) What size will it be?
- (3) Where will it be located?

These are the answers to the final exam. For question one, the answer is “B” since the window is placed there. For question two, the answer is

“C” since the scale box is placed there. The plot will be approximately the same size as the original because of the scale box dimensions. For question three, the answer is “D” since the viewport is placed there.

If you missed question one, study windowing again (paragraphs 2.6.1, 2.6.2, and 2.6.5.1). If you missed question two, then review scaling (paragraphs 2.6.1, 2.6.3, and 2.6.5.2). If you missed question three, then read about viewport again (paragraph 2.6.1).

SECTION 3 DM/PL COMMAND SPECIFICATIONS

NOTE

Disregard this section if your plotter has the HPGL or Tektronix™ firmware options. The HPGL protocol instructions are listed in the *HPGL Compatible Plotter Language Manual* (MI-1005). The Tektronix protocol instructions are listed in paragraph 1.9.4 in this manual.

your plotter from your distributor. However, you can write your own custom programs by using the DM/PL commands.

This section lists the commands that are supported by your plotter.

A full description of each DM/PL command is provided in the *DM/PL Command Language Manual*.

3.1 INTRODUCTION

A variety of software packages are available for

3.2 DM/PL COMMAND DESCRIPTIONS

Listed below are the DM/PL commands that are supported by your plotter:

DESCRIPTION	COMMAND
Plotter Mode One Select	::
Plotter Mode Two Select nn = computer prompt code d = time delay, 0 to 255	::lnn d, or ;l(nn nn nn nn) d,
Plotter Deselect	@
Plotter Reset	Z
UART Setup nnn = setup value	EUnnn,
200 = 7 data bits, no parity, bit 8 = 0, 2 stop bits (default)	
201 = 7 data bits, no parity, bit 8 = 1, 2 stop bits	
206 = 7 data bits, bit 8 = odd parity, 2 stop bits	
222 = 7 data bits, bit 8 = even parity, 2 stop bits	
Plotter Test	T
Pen Up	U
Pen Down	D
Small Chart (half size)	EH
Large Chart (full size)	EF
Coordinate Addressing n = addressing value 1 = 0.001 inch 5 = 0.005 inch M = 0.1 mm	ECn,

DESCRIPTION	COMMAND
Set Velocity n = velocity value 1 = 1 inch/second 2 = 2 inch/second 3 = 3 inch/second	Vn,
Home Position	H
Set Plot Origin	O
Absolute Pen Positioning x,y = coordinates for next point to be plotted	A x,y,
Relative Pen Positioning x,y = coordinates for next point to move to	R x,y,
Move To Specified Coordinate nx = x coordinate (-999,999 to 999,999) ny = y coordinate (-999,999 to 999,999)	nx,ny,
New Pen n = any pen number	Pn,
Line Type n = line type 0 = _____ 1 = _____ 2 = _____ 3 = _____ 4 = _____ 5 = _____ 6 = _____ 7 = _____ 8 = _____ 9 = _____ : = — — — —	Ln,
Circle Plot x = center point x coordinate (-999,999 to 999,999) y = center point y coordinate (-999,999 to 999,999) r = radius (-32,767 to 32,767)	CC x,y,r,
Arc Plot x = center point x coordinate (-32,767 to 32,767) y = center point y coordinate (-32,767 to 32,767) d = arc degrees	CA x,y,d,
Ellipse Plot x = center point x coordinate (-999,999 to 999,999) y = center point y coordinate (-999,999 to 999,999) x1 = lateral axis x coordinate (-32,767 to 32,767) y1 = lateral axis y coordinate (-32,767 to 32,767) x2 = vertical axis x coordinate (-32,767 to 32,767) y2 = vertical axis y coordinate (-32,767 to 32,767)	CE x,y, x1,y1, x2,y2,

DESCRIPTION	COMMAND
General Curve Plot x1,y1 = coordinate pairs along the desired curve x2,y2 (-32,767 to 32,767) ... xn,yn = imaginary curve end point coordinate pair CS = exit from General Curve Plot (-32,767 to 32,767) Symbol Plot r = rotation value 1 = 0° rotation 2 = 90° rotation 3 = 180° rotation 4 = 270° rotation hh = height value 1 = 0.07 inch character 1+ = 0.105 inch character 2 = 0.14 inch character 2+ = 0.21 inch character 3 = 0.28 inch character 3+ = 0.42 inch character 4 = 0.56 inch character 4+ = 0.84 inch character 5 = 1.12 inch character CHR\$(n) = ASCII character, where n is 32 to 126 decimal. __ = exit Symbol Plot Extended Text S = parameter set within () is plotted Sn = character height/width, 0 to 255 Wn = character width only, 0 to 255 I = italic character NI = non-italic (block) character Gn = character set 0 = standard ASCII 1 = mathematics 2 = German 3 = French 4 = Swedish 5 = Danish/Norwegian 6 = Spanish 7 = Italian Xn,Yn = line slope point coordinates CHR\$(n) = ASCII character, 32 to 126 decimal __ = exit Extended Text Extend the Buffer nn = 00 to 7F (hex), default is 5E (caret) End of Text nn = 00 to 7F (hex), default is 5F (underscore)	CG x1,y1, x2,y2, ... xn,yn, CS SrhhCHR\$(n)__ S(Sn,Wn, I/NI,Gn, Xn,Yn) CHR\$(n)__ EBnn, ETnn,

DESCRIPTION	COMMAND
Marker Plot hh = height value 1 = 0.04 inch marker 1+ = 0.06 inch marker 2 = 0.08 inch marker 2+ = 0.12 inch marker 3 = 0.16 inch marker 3+ = 0.24 inch marker 4 = 0.32 inch marker 4+ = 0.48 inch marker 5 = 0.64 inch marker m = symbol value 0 = plus symbol 1 = x symbol 2 = box symbol 3 = octagon symbol 4 = triangle symbol 5 = double triangle symbol	Mhbm
Set Window/Viewport Limits wxll,wyll = window lower left limit coordinates wxur,wyur = window upper right limit coordinates vpxl,vpyll = viewport lower left limit coordinates vpxur,vpyur = viewport upper right limit coordinates (Range of coordinates = -999,999 to 999,999)	W wxll,wyll, wxur,wyur, vpxl,vpyll, vpxur,vpyur,
Report	ER
Plot Pause	EL
Frame Advance n = number of plot increments to advance	Fn,

SECTION 4 MAINTENANCE

4.1 OPERATOR CARE

Your plotter has several sliding surfaces. These are made of stainless steel and plastic so that they are essentially friction free and require no lubricants. They will, however, collect dust and lint which will adversely influence your plotter's performance. Keep your plotter as clean as possible by using a dust cover. When necessary, clean the unit with a soft cloth and alcohol or mild detergent.

4.2 INK ON PLOTTER SURFACE

Use a clean cloth dipped in a concentrated solution of soap and water. Squeeze out excess water and then scrub the affected surface. DO NOT use any aerosol cleaners, such as TV contact cleaner, household wall cleaners, or anything containing a solvent. These may damage certain components.

4.3 CARE OF PAPER

Paper should be handled by its edges. Pen skipping may occur if the paper has smudges or has been contaminated with oil, grease, perspiration, or other contaminants.

CAUTION

Remove the plastic packaging material from the paper or vellum at least 15 minutes before use. This allows it to stabilize dimensionally.

4.4 PEN "TIPS"

All pens should be capped when not in use for extended periods. The ink will dry when exposed for prolonged periods. If a hard nib pen is accidentally left uncapped, the ink supply may possibly be salvaged by dipping the pen tip in water and then rubbing the pen tip on clean paper.

4.5 GENERAL NOTES ON PEN/PAPER

If a transparency is used for graphics, a plastic tip pen with special film ink must be used (see paragraph 1.2.1 for part numbers). A chemical is

included in the ink of this type of pen to produce a permanent trace. If skipping occurs, clean the transparency with alcohol to remove the contaminants. The trace produced by standard ink pens will rub off when used on a transparency.

Always replace the protective pen caps when the pens are not in use.

4.6 OPERATING VOLTAGE CONVERSION

The plotter can operate on 100, 120, 220, or 240 VAC ($\pm 10\%$) line voltage. To convert the plotter's operating voltage, use the following steps.

1. Set the POWER switch to OFF.
2. Disconnect the ends of the power cord from the AC power outlet and the AC receptacle on the bottom of the plotter (see Figure 4-1).
3. Slide the protective window (over the fuse cavity) to the left.
4. Pull the FUSE PULL lever out and remove the fuse.
5. Pull the voltage select board (located inside the fuse cavity and below the fuse holder) out from the fuse cavity.
6. As shown in Figure 4-1, one side of the voltage select board has the numbers "120" and "240" printed on it, while the other side has "220" and "100." These numbers indicate operating voltages of 100, 120, 220, and 240 VAC.

Hold the board in your hand so that the number corresponding to the desired operating voltage (100, 120, 220, or 240) appears upright on the left side of the board (the other number on the right will be upside down).

While holding the board in this orientation, slide it into place inside the fuse cavity (see Figure 4-1). The number indicating the selected operating voltage will now be visible through the fuse cavity window.

4-2 MAINTENANCE

7. DO NOT install the fuse removed in step 4. The fuse ratings for 100/120 VAC and 220/240 VAC are different. It MUST correspond to the operating voltage to prevent possible damage to the plotter. If the plotter was converted to 100 or 120 VAC, install a 250V 3AG 1.0 Amp fuse. If the plotter was converted to 220 or 240 VAC, install a 250V 3AG 0.5 Amp fuse.
8. Close the protective window over the fuse cavity by sliding it to the right.
9. Connect the power cord to the plotter's AC receptacle and to the AC power outlet. The plotter is now ready for operation on the selected AC line voltage.

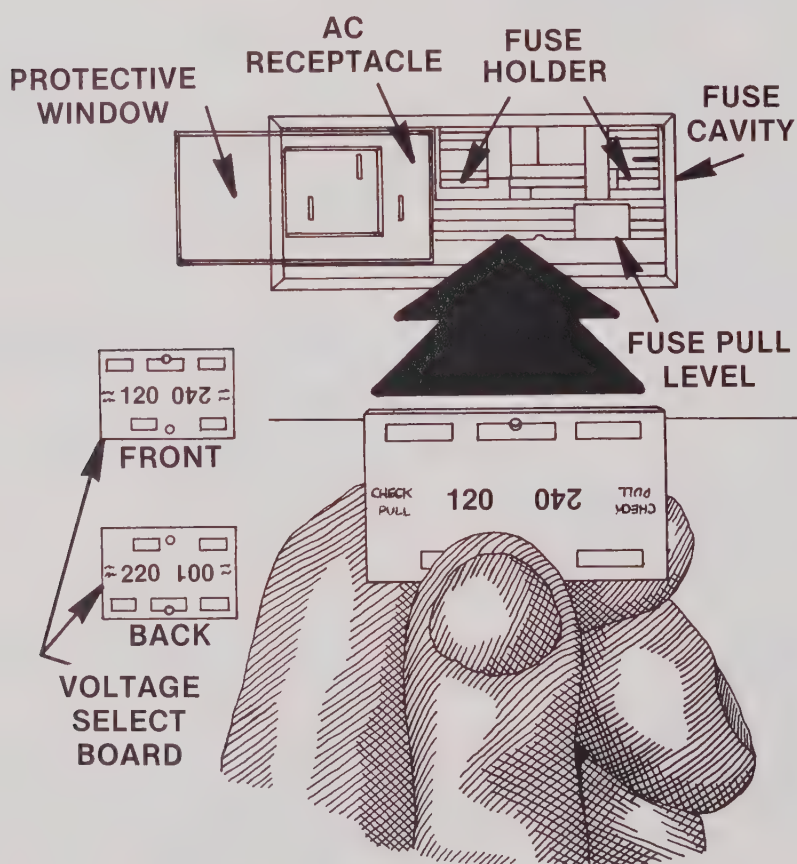


FIGURE 4-1
VOLTAGE SELECT BOARD

4.7 CLEANING GRIT WHEELS

The grit wheel area of the plot drum can become clogged with accumulated residue from the plotting materials. This can cause slippage of the plotting material between the plot drum and the pinch rollers, resulting in inaccurate plots.

The following steps explain how to clean the grit wheels when necessary. Note that the special cleaning strips (part number DMP40-303) are available from your Houston Instrument product distributor.

1. Remove plotting material from the plotter.
2. Place the plotter in MODE 1 (local).
3. Remove the protective liner from the part number DMP40-303 cleaning strip.
4. Open the right pinch roller arm.
5. Place the cleaning strip between the pinch roller and the plot drum, with the tacky side of the cleaning strip toward the grit wheel as shown in Figure 4-2.
6. Using the front panel ↑ and ↓ controls, slew the cleaning strip back and forth several times until all residue is removed from the grit wheel.
7. Open the right pinch roller arm and remove the cleaning strip.
8. Repeat steps four through seven for the left grit wheel.
9. Residue can be removed from the cleaning strip by washing it in cold water.

Thoroughly dry the cleaning strip and store it in the protective liner.

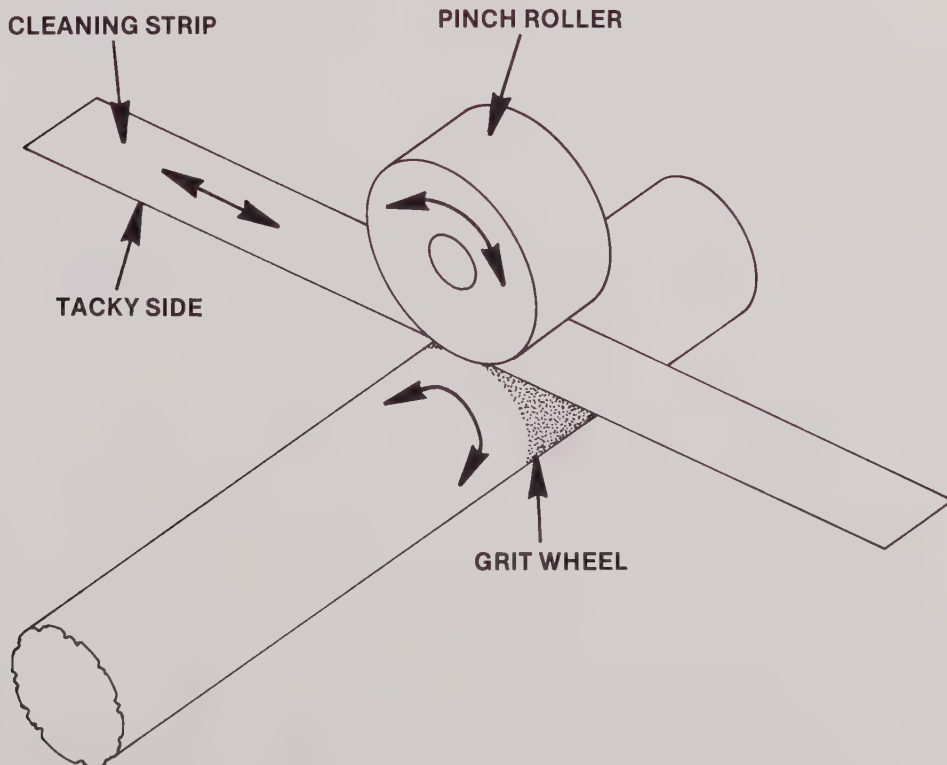


FIGURE 4-2
CLEANING GRIT WHEEL

SECTION 5 ASSEMBLY DRAWINGS AND PARTS LISTS

5.1 INTRODUCTION

This section contains the Assembly Drawings and complete Parts Lists for the DMP-41 and DMP-42 plotters. Use the Assembly Drawings to locate the needed part and then refer to the accompanying Parts List for information on that part.

When ordering parts be sure to include the following information:

- Machine Model Number
- Machine Serial Number
- Part Number
- Part Description

The Machine Model and Serial Numbers are found on the label attached to the bottom of the plotter. The Part Number and Description are found on the Parts Lists in this section.

All parts must be ordered from your local Houston Instrument product distributor.

5.2 ORGANIZATION

Figure 5-1 shows the complete DMP-41/DMP-42 plotter. Figure 5-2 shows the Logic Board

Assembly used in the plotter. All plotter components are shown in these two figures. Unless otherwise noted in the accompanying Parts Lists, the components shown in Figure 5-1 and Figure 5-2 are used in both the DMP-41 and the DMP-42 plotters.

The parts lists are organized as exploded-view parts lists. Find the part you want in a figure and note the circled reference number or the Logic Board reference designator. Then refer to the Parts List associated with the Assembly Drawing and use the reference number to find the information you need for the part.

The Parts List for each figure has six columns of information. The REF NO. column is an alphanumeric listing of the reference numbers. It includes the circled reference numbers and the circuit reference designators for the Logic Board components.

The LEVEL column indicates the relative level of subordination of the part to help you find the next higher level assembly, if needed. For example, a part at LEVEL 3 is a subassembly of the preceding part at LEVEL 2, while a part at LEVEL 4 is a subordinate to the preceding part at LEVEL 3.

The DESCRIPTION, PART NUMBER, REV. (revision), and QTY (quantity) of each part are also listed for ordering purposes.

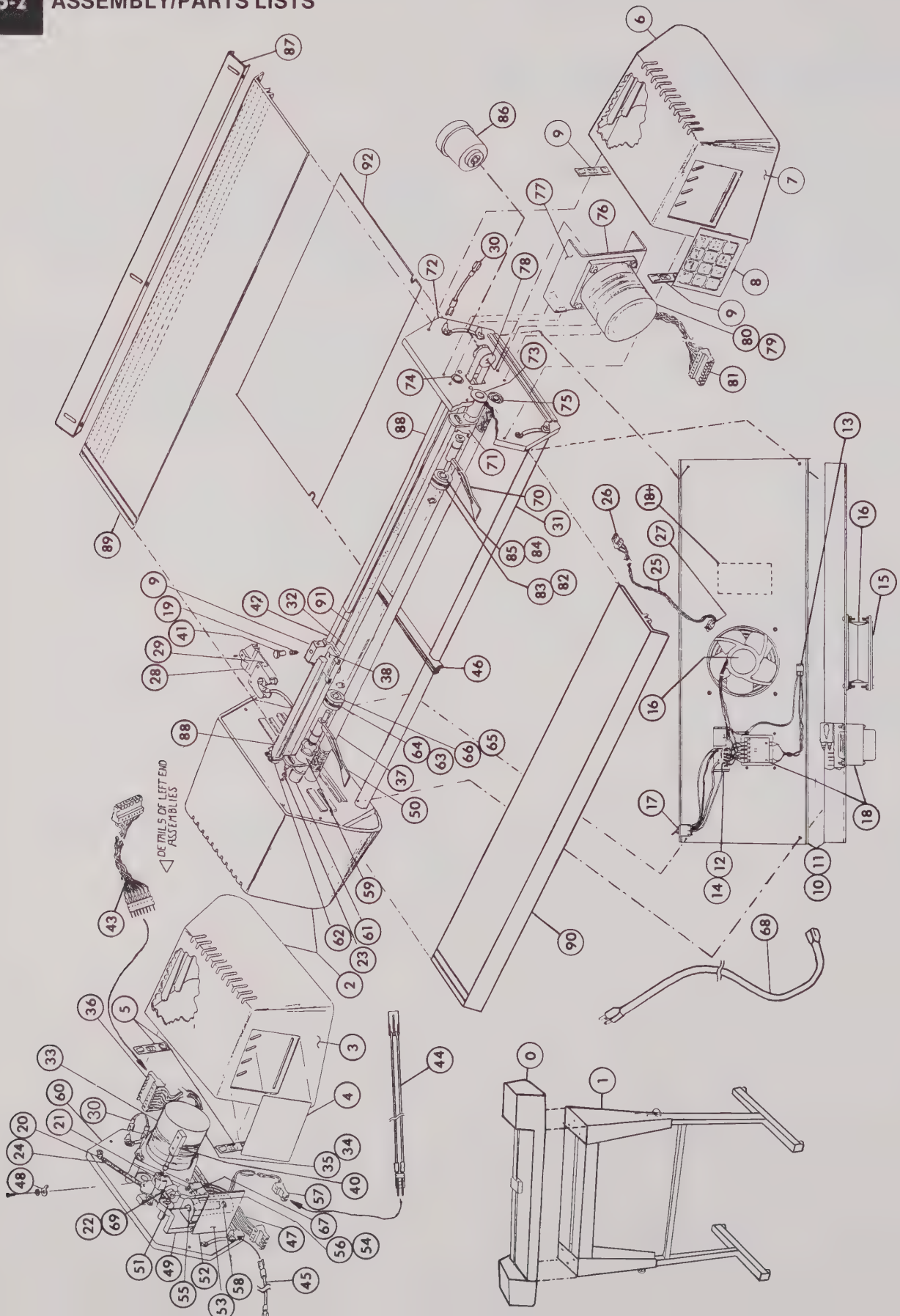


FIGURE 5-1
DMP41/42 ASSEMBLY DRAWING

TABLE 5-1
DMP41/42 ASSEMBLY PARTS LIST

REF NO.	LEVEL	DESCRIPTION	PART NUMBER	REV.	QTY
0	1	DMP41 PLOTTER	DMP-41	A	1
0	1	DMP42 PLOTTER	DMP-42	A	1
1	2	ASSY,BASE STAND	DMP41-29		1
	2	ASSY,COVER,DMP-41	DMP41-40		1
	2	ASSY,COVER,DMP-42	DMP41-86	A	1
2	3	ASSY,LEFT COVER	DMP40-52	A	1
3	4	COVER,END	DMP40-1		1
4	4	DECAL,REAR PANEL	DMP40-62		1
5	4	FASTENER,CASE	HR29-113		2
6	3	ASSY,RIGHT COVER	DMP40-53	A	1
7	4	COVER,END	DMP40-1		1
8	4	SWITCH,MEMBRANE	DMP40-43		1
9	4	FASTENER,CASE	HR29-113		2
10	3	ASSY,BOTTOM COVER,DMP-41	DMP41-77		1
10	3	ASSY,BOTTOM COVER,DMP-42	DMP41-103	A	1
11	4	COVER,BOTTOM,DMP-41	DMP41-10		1
11	4	COVER,BOTTOM,DMP-42	DMP41-56		1
12	4	CONN. CORCOM #6J4	MC-1614		1
13	4	CONN. 3 PIN FEMALE	MC-1648		1
14	4	FUSE,1AMP SLO BLO	MF-35		1
15	4	GUARD,FAN	MF-67		1
16	4	FAN,PANAMOTOR 4600 X	MF-2		1
17	4	SWITCH,TOGGLE	MS-640		1
18	4	TRANSFORMER,DMP-41	MT-559		1
18 +	4	LABEL,SERIAL # TAG,DMP-41	DMP-237		1
18 +	4	LABEL,SERIAL # TAG,DMP-42	DMP41-105		1
	2	ASSY,MAINFRAME,DMP-41	DMP41-41		1
	2	ASSY,MAINFRAME,DMP-42	DMP41-104	A	1
19	3	SPRING,PEN PRESSURE	2000-192		1
20	3	HOLDER,SPRING	DMP40-121		1
21	3	ACTUATOR,PEN	DMP40-15		1
22	3	ASSY,Y AXIS IDLER PULLEY	DMP40-20	G	1
23	3	O-RING,5X32 I.D. X	MR-1531		4
24	3	SPRING,PEN LIFT	DMP40-33		1
25	3	ASSY,WIRING VOLTAGE REG.	DMP40-58	A	1
26	4	CONN. 3 PIN FEM. 22 AWG	MC-1482		1
27	4	REGULATOR MC7805CT	MW-201		1
28	3	ASSY,PEN HOLDER	DMP40-63	C	1
29	4	SPRING	HR29-93		1
30	3	ASSY,JUMPER GROUNDING	DMP40-80		2
31	3	ROD,SUPPORT,DMP-41	DMP41-1		2
31	3	ROD,SUPPORT,DMP-42	DMP41-70		2
32	3	BAR,PEN,FRONT,DMP-41	DMP41-2		1
32	3	BAR,PEN,FRONT,DMP-42	DMP41-69		1
33	3	ASSY,X-AXIS DRIVE,DMP-41	DMP41-20	B	1
33	3	ASSY,X-AXIS DRIVE,DMP-42	DMP41-61	A	1
34	4	ASSY,STEPPER MTR,WIRED	DMP40-38	E	1
35	5	MOTOR,STEPPER	DMP40-31		1
36	5	CONN. 8 PIN FEMALE,22 AWG	MC-1454		1
37	4	SHAFT,DRIVE,DMP-41	DMP41-4		1
37	4	SHAFT,DRIVE,DMP-42	DMP41-67		1
38	3	ASSY,BELT CLAMP	DMP41-22		1
39	3	CARRIAGE,PEN	DMP41-26		1

TABLE 5-1
DMP41/42 ASSEMBLY PARTS LIST (continued)

REF NO.	LEVEL	DESCRIPTION	PART NUMBER	REV.	QTY
40	3	ADAPTER,PENLIFT BAR	DMP41-27		1
41	3	SLUG,PEN PRESURE	DMP41-28		1
42	3	BAR,PEN,REAR,DMP-41	DMP41-3		1
42	3	BAR,PEN,REAR,DMP-42	DMP41-68		1
43	3	JUMPER CABLE,X-AXIS DR	DMP41-32	B	1
	4	CONN. 8 PIN FEMALE,22 AWG	MC-1454		1
	4	CONN. 8 PIN MALE	MC-1456		1
44	3	JUMPER CABLE,PEN LIFT SOL	DMP41-33	A	1
	4	CONN. 2 PIN FEMALE,22 AWG	MC-1453		1
	4	CONN. 2 PIN MALE	MC-1458		1
45	3	JUMPER,U.L.GROUNDING	DMP41-34		2
46	3	RETAINER,P.C. BOARD	DMP41-35		1
47	3	ASSY,SENSOR CABLE	DMP41-36	B	1
	4	CONN. 6 PIN FEMALE	MC-1657		1
	4	CONNECTOR,FEMALE 4 PIN	MC-1715		1
48	3	CLAMP,CABLE	HR29-149		1
	3	ASSY,LEFT SIDE	DMP41-43		1
49	4	RETAINER,STRING,	DMP40-153		1
50	4	ROLLER,CAM-PINCH,LEFT	DMP40-2		1
51	4	PULLEY,PEN LIFT	DMP40-24		1
52	4	ASSY,PEN LIFT,SOLENOID	DMP40-64	E	1
53	5	BRACKET,PEN SOLENOID	DMP40-17		1
54	5	ASSY,SOLENOID,WIRED	DMP40-94	D	1
55	6	PLUNGER,SOLENOID	DMP40-138		1
56	6	BODY,SOLENOID	HR29-293		1
57	6	CONN. 2 PIN FEMALE,22 AWG	MC-1453		1
58	5	CUSHION	HR29-134		1
59	4	CAM STOP,LEFT	DMP40-8		1
60	4	ASSY,END PLATE-LEFT	DMP41-13	B	1
61	6	BUSHING,.377 I.D.	MB-230		1
62	5	BEARING, PEN LIFT ROD	MB-237		1
63	4	ASSY,CAM,ROLLER	DMP41-81		1
64	5	ASSY,CAM,ROLLER,MOLDED	DMP41-72	A	1
65	6	HUB,CAM ROLLER	DMP40-6		1
66	5	BUSHING	MB-232		1
67	4	I.C.OPTICAL COUPLER	MW-846		1
68	3	CORD, BELDEN 17251B	MC-1184		1
69	3	BEARING,LUB.ANDOK C	MB-212		2
	3	ASSY,RIGHT SIDE	DMP41-44		1
70	4	ROLLER,CAM-PINCH,RIGHT	DMP40-3		1
71	4	CAM STOP,RIGHT	DMP40-9		1
72	4	ASSY,END PLATE-RIGHT	DMP41-14	B	1
73	6	BUSHING,.377 I.D.	MB-230		1
74	5	BEARING, PEN LIFT ROD	MB-237		1
75	5	BEARING	MB-8		1
76	4	ASSY,MOTOR,Y AXIS	DMP41-74		1
77	5	MOUNT,MOTOR,Y AXIS	DMP40-12		1
78	5	ASSY,DRIVER PULLEY,MOD.	DMP40-147		1
79	5	ASSY,MOTOR,WIRED	DMP41-75		1
80	6	MOTOR,STEPPER	DMP41-76		1
81	6	CONN. 8 PIN FEMALE,22 AWG	MC-1454		1
82	4	ASSY,CAM,ROLLER	DMP41-81		1
83	5	ASSY,CAM,ROLLER,MOLDED	DMP41-72	A	1

TABLE 5-1
DMP41/42 ASSEMBLY PARTS LIST (continued)

REF NO.	LEVEL	DESCRIPTION	PART NUMBER	REV.	QTY
84	6	HUB,CAM ROLLER	DMP40-6		1
85	5	BUSHING	MB-232		1
86	4	DAMPER,FERROFLUIDICS # 315	MD-156		1
87	3	PLATEN,EXTENSION,DMP-41	DMP41-47		1
87	3	PLATEN,EXTENSION,DMP-42	DMP41-58		1
88	3	ROD,PEN LIFT,DMP-41	DMP41-6		1
88	3	ROD,PEN LIFT,DMP-42	DMP41-65		1
89	3	PLATEN,REAR,DMP-41	DMP41-7		1
89	3	PLATEN,REAR,DMP-42	DMP41-64		1
90	3	PLATEN,FRONT,DMP-41	DMP41-8		1
90	3	PLATEN,FRONT,DMP-42	DMP41-63		1
91	3	BELT (MODIFIED),DMP-41	DMP41-9		1
91	3	BELT (MODIFIED),DMP-42	DMP41-62		1
92	2	ASSY,LOGIC BD,FINAL	DMP41-73		1

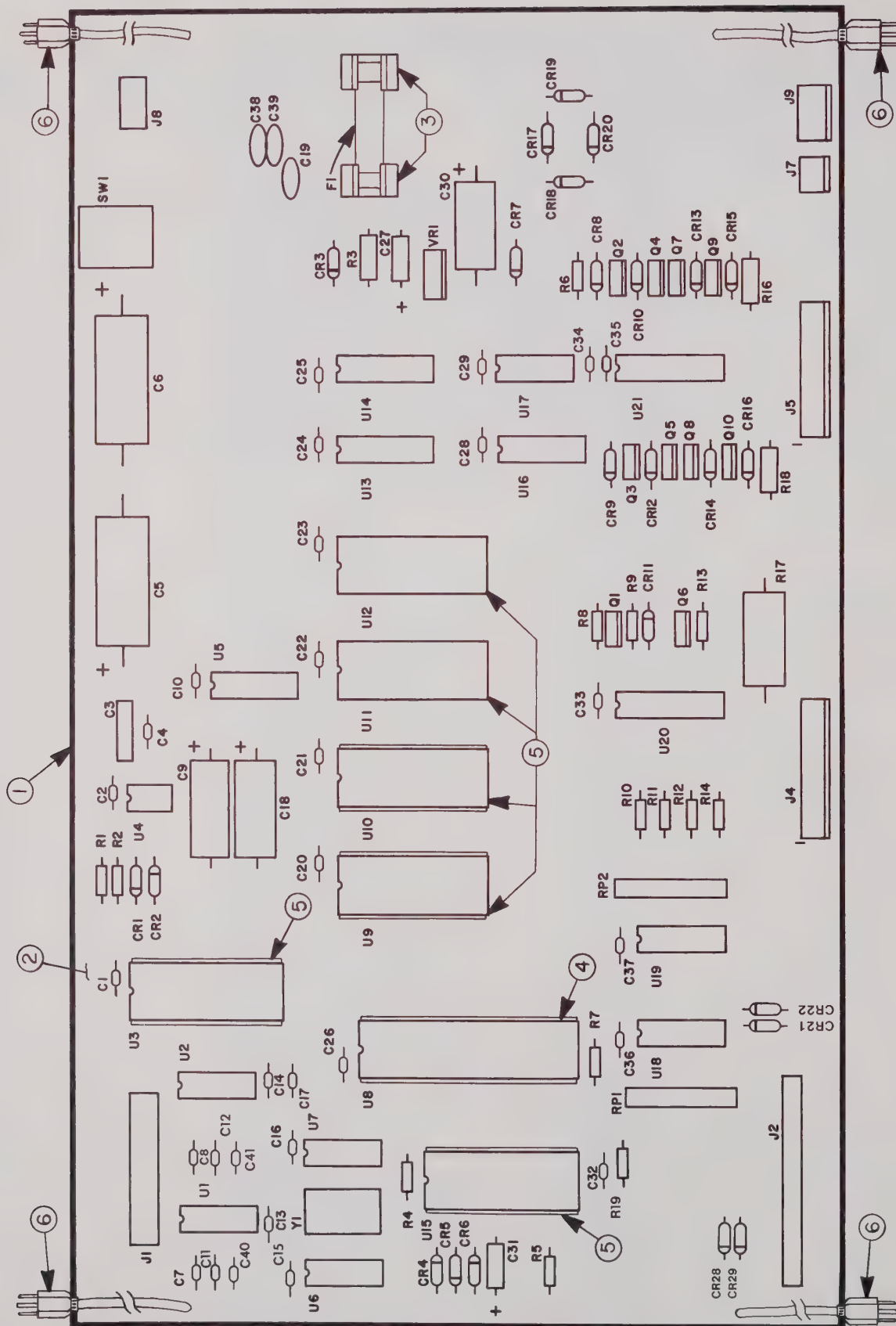


FIGURE 5-2
DMP41-73 LOGIC BOARD ASSEMBLY DRAWING

TABLE 5-2
DMP41-73 LOGIC BOARD PARTS LIST

REF NO.	LEVEL	DESCRIPTION	PART NUMBER	REV.	QTY
1	2	ASSY, LOGIC BD, FINAL	DMP41-73	N	1
2	3	ASSY, LOGIC BD.	DMP40-39		1
3	4	FUSE CLIP	MF-60		2
4	4	SOCKET, 40 PIN DIP	MS-156		1
5	4	SOCKET, I.C. 28 PIN DIP	MS-523		6
6	4	ASSY, PIGTAIL GROUNDING	DMP40-79		4
C1	4	CAP .1MFD 10V CER	MC-448		1
C2	4	CAP .1MFD 25V CER	MC-571		1
C3	4	CAP. .01MFD 630V 10%	MC-375		1
C4	4	CAP .01MFD 100V 20% D CER	MC-229		1
C5	4	CAP, 330MFD, 35V	MC-1806		1
C6	4	CAP, 330MFD, 35V	MC-1806		1
C7	4	CAP 330 PFD 20% 1KV CERAM	MC-1040		1
C8	4	CAP 330 PFD 20% 1KV CERAM	MC-1040		1
C9	4	CAP 50MFD 25V ELECTROLYTC	MC-339		1
C10	4	CAP .1MFD 10V CER	MC-448		1
C11	4	CAP 330 PFD 20% 1KV CERAM	MC-1040		1
C12	4	CAP 330 PFD 20% 1KV CERAM	MC-1040		1
C13	4	CAP .1MFD 10V CER	MC-448		1
C14	4	CAP .1MFD 25V CER	MC-571		1
C15	4	CAP .1MFD 10V CER	MC-448		1
C16	4	CAP .1MFD 10V CER	MC-448		1
C17	4	CAP .1MFD 25V CER	MC-571		1
C18	4	CAP 50MFD 25V ELECTROLYTC	MC-339		1
C19	4	CAP .001MFD 1000V CER	MC-579		1
C20	4	CAP .1MFD 10V CER	MC-448		1
C21	4	CAP .1MFD 10V CER	MC-448		1
C22	4	CAP .1MFD 10V CER	MC-448		1
C23	4	CAP .1MFD 10V CER	MC-448		1
C24	4	CAP .1MFD 10V CER	MC-448		1
C25	4	CAP .1MFD 10V CER	MC-448		1
C26	4	CAP .1MFD 10V CER	MC-448		1
C27	4	CAP 1MFD 35V 10% TANT	MC-535		1
C28	4	CAP .1MFD 10V CER	MC-448		1
C29	4	CAP .1MFD 10V CER	MC-448		1
C30	4	CAP 50MFD 25V ELECTROLYTC	MC-339		1
C31	4	CAP 10MFD 35V LYTC	MC-542		1
C32	4	CAP .1MFD 10V CER	MC-448		1
C33	4	CAP .1MFD 10V CER	MC-448		1
C34	4	CAP .01MFD 100V 20% D CER	MC-229		1
C35	4	CAP .1MFD 10V CER	MC-448		1
C36	4	CAP .1MFD 10V CER	MC-448		1
C37	4	CAP .1MFD 10V CER	MC-448		1
C38	4	CAP .001MFD 1000V CER	MC-579		1
C39	4	CAP .001MFD 1000V CER	MC-579		1
CR1	4	DIODE, RECTIFR. 1AMP 600PIV	MD-25		1
CR2	4	DIODE, RECTIFR. 1AMP 600PIV	MD-25		1
CR3	4	DIODE 1N4744A	MD-19		1
CR4	4	DIODE, RECTIFR. 1AMP 600PIV	MD-25		1
CR5	4	DIODE, RECTIFR. 1AMP 600PIV	MD-25		1
CR6	4	DIODE, RECTIFR. 1AMP 600PIV	MD-25		1
CR7	4	DIODE, RECTIFR. 1AMP 600PIV	MD-25		1
CR8	4	DIODE, RECTIFR. 1AMP 600PIV	MD-25		1

TABLE 5-2
DMP41-73 LOGIC BOARD PARTS LIST (continued)

REF NO.	LEVEL	DESCRIPTION	PART NUMBER	REV.	QTY
CR9	4	DIODE,RECTIFR.1AMP 600PIV	MD-25		1
CR10	4	DIODE,RECTIFR.1AMP 600PIV	MD-25		1
CR11	4	DIODE,RECTIFR.1AMP 600PIV	MD-25		1
CR12	4	DIODE,RECTIFR.1AMP 600PIV	MD-25		1
CR13	4	DIODE,RECTIFR.1AMP 600PIV	MD-25		1
CR14	4	DIODE,RECTIFR.1AMP 600PIV	MD-25		1
CR15	4	DIODE,RECTIFR.1AMP 600PIV	MD-25		1
CR16	4	DIODE,RECTIFR.1AMP 600PIV	MD-25		1
CR17	4	DIODE GE 1N5624	MD-126		1
CR18	4	DIODE GE 1N5624	MD-126		1
CR19	4	DIODE GE 1N5624	MD-126		1
CR20	4	DIODE GE 1N5624	MD-126		1
CR21	4	DIODE IN3070 (DMP-41 ONLY)	MD-8		1
CR22	4	DIODE IN3070 (DMP-42 ONLY)	MD-8		1
CR28	4	DIODE IN3070 (METRIC ONLY)	MD-8		1
CR29	4	DIODE IN3070 (TWO-PEN ONLY)	MD-8		1
F1	4	FUSE,4AMP SLO BLO	MF-98		1
J1	4	CONNECTOR,25 PIN	MC-1132		1
J2	4	CONN,19 PIN,RT.ANGLE,MALE	MC-1810		1
J4	4	CONN. 8 PIN MALE	MC-1456		1
J5	4	CONN. 8 PIN MALE	MC-1456		1
J7	4	CONN. 2 PIN MALE	MC-1458		1
J8	4	CONN. 3 PIN MALE	MC-1805		1
J9	4	CONNECTOR,MALE 4PIN	MC-1713		1
Q1	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q2	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q3	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q4	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q5	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q6	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q7	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q8	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q9	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
Q10	4	TRANSISTOR MJE-800 + L54Z	MQ-75		1
R1	4	RES 1K 5% 1/4W CF	MR-963		1
R2	4	RES 33K 5% 1/4W CF	MR-481		1
R3	4	RES 68 OHM 10% 1/2W CC	MR-77		1
R4	4	RES 220 OHM 5% 1/3W CF	MR-107		1
R5	4	RES 470 OHM 5% 1/4W CF	MR-972		1
R6	4	RES 120 OHM 5% 1/4W CF	MR-1534		1
R7	4	RES 470 OHM 5% 1/4W CF	MR-972		1
R8	4	RES 1K 5% 1/4W CF	MR-963		1
R9	4	RES 33 OHM 5% 1/4W CF	MR-945		1
R10	4	RES 390 OHM 5% 1/4W CF	MR-170		1
R11	4	RES 390 OHM 5% 1/4W CF	MR-170		1
R12	4	RES 390 OHM 5% 1/4W CF	MR-170		1
R13	4	RES 1K 5% 1/4W CF	MR-963		1
R14	4	RES 390 OHM 5% 1/4W CF	MR-170		1
R16	4	RES 47 OHM 5% 1/2W CC	MR-10		1
R17	4	RES,10 OHM,5W,5%	MR-1535		1
R18	4	RES 47 OHM 5% 1/2W CC	MR-10		1
R19	4	RES 33K 5% 1/4W CF	MR-481		1
RP1	4	RESISTOR NETWORK	MW-322		1

TABLE 5-2
DMP41-73 LOGIC BOARD PARTS LIST (continued)

REF NO.	LEVEL	DESCRIPTION	PART NUMBER	REV.	QTY
RP2	4	RESISTOR NETWORK	MW-322		1
U1	4	I.C.DS1489	MW-455		1
U2	4	I.C. MC1488	MW-530		1
U3	4	I.C. INTEL P8251A	MW-560		1
U4	4	LM555CN/B + TIMER	MW-197		1
U5	4	I.C. DM74LS138/B +	MW-477		1
U6	4	I.C. DM74LS74N/B +	MW-348		1
U7	4	I.C. DM74LS14N/B +	MW-344		1
U8	4	I.C. MK3880N	MW-387		1
U13	4	IC MM 2114N-L	MW-479		1
U14	4	IC MM 2114N-L	MW-479		1
U15	4	I.C. MOSTEK # 3882/Z80CTC	MW-474		1
U16	4	I.C. DM74LS138/B +	MW-477		1
U17	4	I.C.SN74LS08N/B +	MW-391		1
U18	4	I.C. SN74LS367	MW-398		1
U19	4	I.C. SN74LS367	MW-398		1
U20	4	I.C. 74LS374	MW-549		1
U21	4	I.C. 74LS374	MW-549		1
VR1	4	CONN. 3 PIN MALE	MC-1457		1
Y1	4	CRYSTAL,CLOCK,4.9152 MHZ	MC-1807		1
U9	3	See paragraph 5.3.			
U10	3	See paragraph 5.3.			
U11	3	See paragraph 5.3.			

5.3 ROM LISTINGS

Table 5-3 is a listing of the revisions to the ROMs used in the DMP-41 and DMP-42 plotters. Note the following when referring to these ROM listings:

- The ROMs are listed by family or generation.
- The ROMs must only be used in a matched set.
- The ROMs are ordered by individual part number.
- The last family listed has the most recent versions of the ROMs.
- It is possible that a given ROM is used in more than one family.

**TABLE 5-3
ROM LISTINGS**

PART NUMBER	REV.	DESCRIPTION	NOTES
MW-890	D	ROM 1, U9	Original issue.
MW-891	D	ROM 2, U10	Original issue.
MW-892	D	ROM 3, U11	Original issue.
MW-921	001	ROM 1, U9	Replaces MW-890.
MW-922	001	ROM 2, U10	Replaces MW-891.
NOTE ROM 3, U11, has been deleted due to the use of larger capacity ROMs for ROM 1 and ROM 2.			
MW-921	002	ROM 1, U9	Add EB, ET, EU commands.
MW-922	002	ROM 2, U10	Add EB, ET, EU commands.
MW-921	003	ROM 1, U9	Enhance Mode 2 setup.
MW-922	003	ROM 2, U10	Enhance Mode 2 setup.

SECTION 6 SCHEMATIC DIAGRAM

6.1 INTRODUCTION

This section contains the plotter schematic diagram (see Figure 6-1). This schematic diagram

(drawing number DMP40-42) is for the part number DMP41-41 Serial Logic Board used in the DMP-41 and DMP-42 plotters.

6-2 SCHEMATIC DIAGRAM

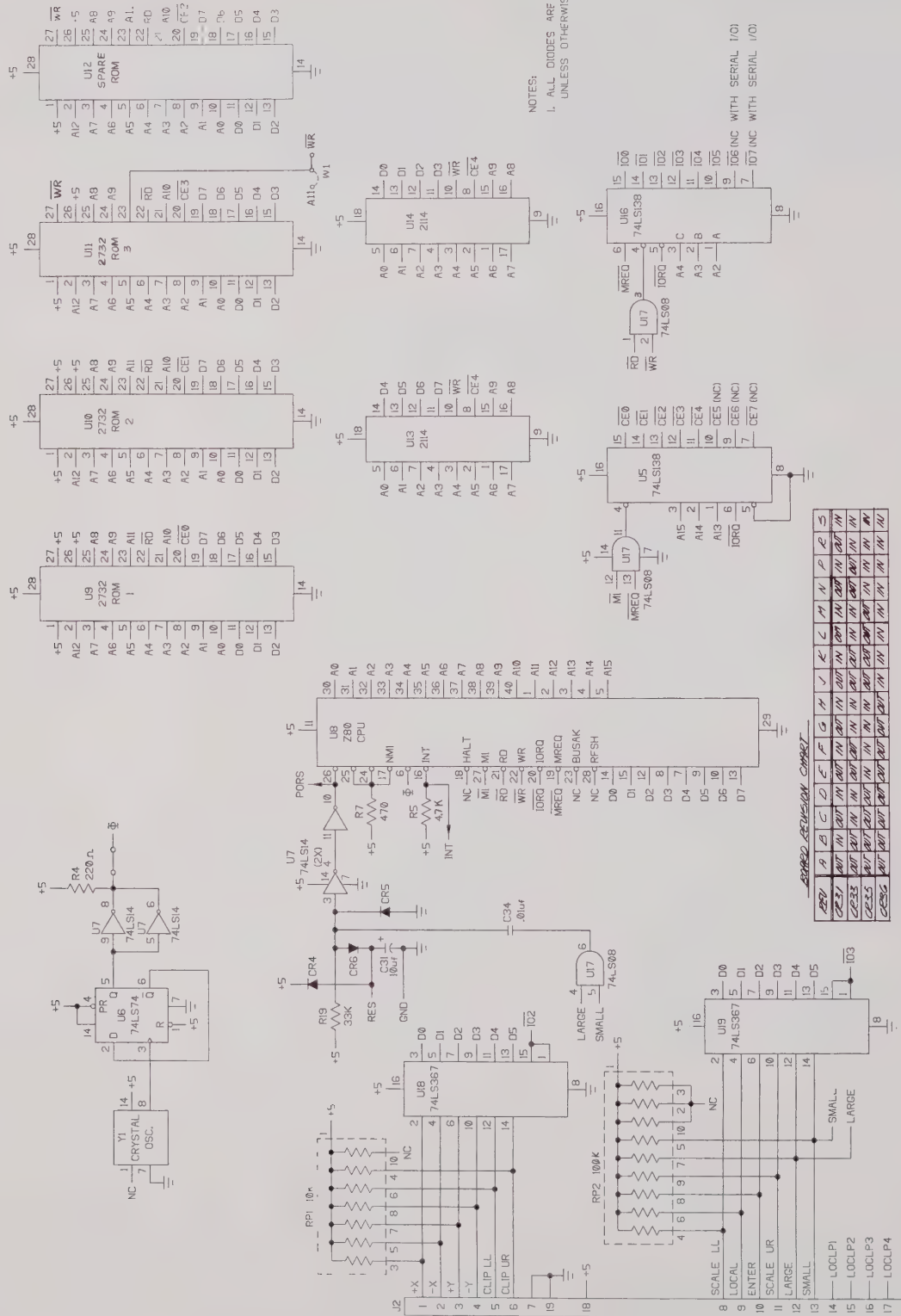


FIGURE 6-1
SERIAL LOGIC BOARD, REV. G, (sheet 1 of 2)

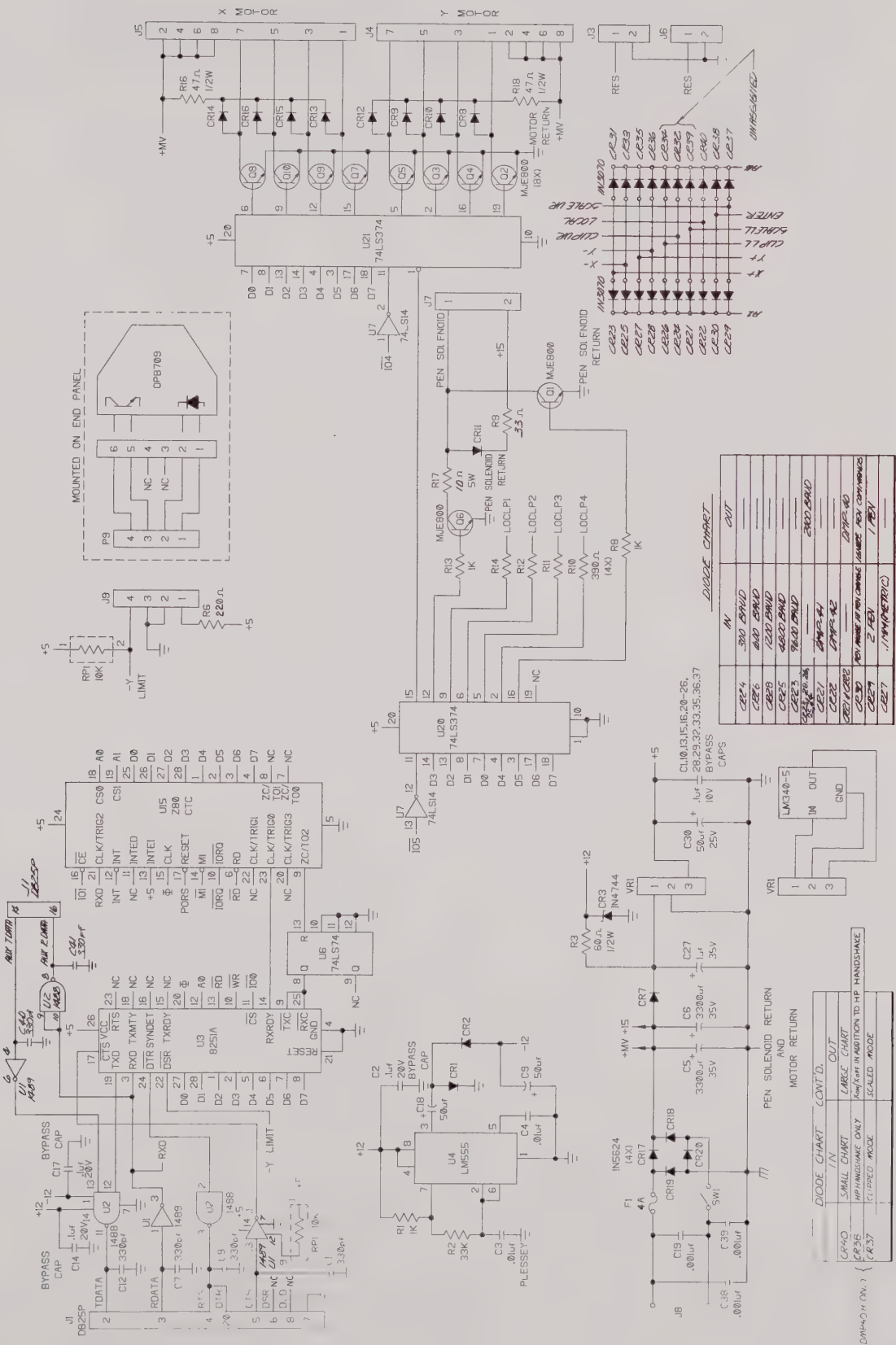


FIGURE 6-1
SERIAL LOGIC BOARD, REV. K, (sheet 2 of 2)

APPENDIX A
ASCII CHARACTER SET

DEC	HEX	OCT	CHAR
00	00	00	NUL (note 1)
01	01	01	SOH (note 1)
02	02	02	STX (note 1)
03	03	03	ETX (note 1)
04	04	04	EOT (note 1)
05	05	05	ENQ (note 1)
06	06	06	ACK (note 1)
07	07	07	BEL (note 1)
08	08	10	BS
09	09	11	HT (note 1)
10	0A	12	LF
11	0B	13	VT (note 1)
12	0C	14	FF (note 1)
13	0D	15	CR
14	0E	16	SO (note 1)
15	0F	17	SI (note 1)
16	10	20	DLE (note 1)
17	11	21	DC1
18	12	22	DC2
19	13	23	DC3 (note 1)
20	14	24	DC4 (note 1)
21	15	25	NAK (note 1)
22	16	26	SYN (note 1)
23	17	27	ETB (note 1)
24	18	30	CAN (note 1)
25	19	31	EM (note 1)
26	1A	32	SUB (note 1)
27	1B	33	ESC (note 1)
28	1C	34	FS (note 1)
29	1D	35	GS (note 1)
30	1E	36	RS (note 1)
31	1F	37	US (note 1)
32	20	40	(blank)
33	21	41	!
34	22	42	"
35	23	43	#
36	24	44	\$
37	25	45	%
38	26	46	&
39	27	47	'
40	28	50	(
41	29	51	)
42	2A	52	*
43	2B	53	+
44	2C	54	,
45	2D	55	-
46	2E	56	.
47	2F	57	/
48	30	60	0
49	31	61	1
50	32	62	2
51	33	63	3
52	34	64	4

APPENDIX A
ASCII CHARACTER SET (continued)

DEC	HEX	OCT	CHAR
53	35	65	5
54	36	66	6
55	37	67	7
56	38	70	8
57	39	71	9
58	3A	72	:
59	3B	73	;
60	3C	74	<
61	3D	75	=
62	3E	76	>
63	3F	77	?
64	40	100	@
65	41	101	A
66	42	102	B
67	43	103	C
68	44	104	D
69	45	105	E
70	46	106	F
71	47	107	G
72	48	110	H
73	49	111	I
74	4A	112	J
75	4B	113	K
76	4C	114	L
77	4D	115	M
78	4E	116	N
79	4F	117	O
80	50	120	P
81	51	121	Q
82	52	122	R
83	53	123	S
84	54	124	T
85	55	125	U
86	56	126	V
87	57	127	W
88	58	130	X
89	59	131	Y
90	5A	132	Z
91	5B	133	[
92	5C	134	\
93	5D	135	]
94	5E	136	(caret)
95	5F	137	—
96	60	140	,
97	61	141	a
98	62	142	b
99	63	143	c
100	64	144	d
101	65	145	e
102	66	146	f
103	67	147	g
104	68	150	h
105	69	151	i

APPENDIX A
ASCII CHARACTER SET (continued)

DEC	HEX	OCT	CHAR
106	6A	152	j
107	6B	153	k
108	6C	154	l
109	6D	155	m
110	6E	156	n
111	6F	157	o
112	70	160	p
113	71	161	q
114	72	162	r
115	73	163	s
116	74	164	t
117	75	165	u
118	76	166	v
119	77	167	w
120	78	170	x
121	79	171	y
122	7A	172	z
123	7B	173	{
124	7C	174	
125	7D	175	}
126	7E	176	~
127	7F	177	DEL (note 1)

NOTES

1. This character is not normally used by the plotter. It is treated as a "no operation" command. However, the user can define this character as a terminator. The plotter will then respond to it.

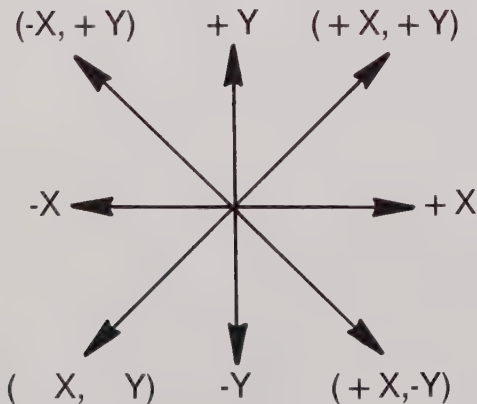
APPENDIX B PLOTING THEORY

B.1 DIGITAL PLOTTER FUNDAMENTALS

After watching the plotter perform during a remote plotting session or the self-test routine, you may wonder how it "knows" where to draw the lines that create the plot. The plotter uses the properties of the Cartesian coordinate system. Two axes, customarily designated as "x" and "y," are constructed perpendicular to each other and intersect at a reference point, or origin.

As shown in Figure B-1, the positive quantities lie above and to the right of the origin. Negative quantities lie below and to the left of the origin.

The second example in Figure B-1 shows how the system is used to define the location of points on a plane. Note that the distances measured upon each axis are referenced from the origin, and the perpendicular projection of each measure defines point "A." Thus, two distances (x and y) describe the location of any position on a plane with respect to the point of reference (the origin). In digital plotting, point "A" is defined as a set of vector pairs relative to the origin. For example, $x = 3$, $y = 4$.



B.2 ABSOLUTE VECTOR PAIRS

In an absolute system, the area to be plotted can be thought of as a field. If it were laid out in a grid pattern corresponding to the x and y axes, then any point on the field would have a corresponding set of vector pairs. In Figure B-1, the vector pair for point "B" is $x = 1$, $y = 7$ in an absolute system.

B.3 RELATIVE VECTOR PAIRS

In a relative system, the plotting area can also be thought of as a gridded field (as in the case of an absolute system). However, rather than point "B" being based on the origin (as in an absolute system), it is **RELATIVE** to point "A." In a relative system, each successive set of vector pairs is relative to the last set (or point).

In other words, point "A" is based on the origin, point "B" is based on point "A," and so on. Therefore, the vector pair for point "B" in a relative system is $x = -2$, $y = 3$ (using point "A" as the reference point). Point "B" will now be the reference point for a subsequent point "C."

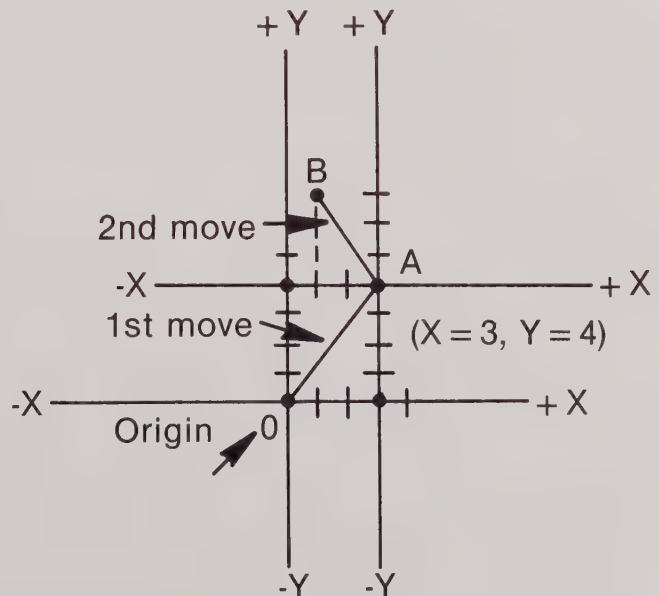


FIGURE B-1
CARTESIAN COORDINATE SYSTEM

B.4 THE INCREMENTAL PATH

The term “incremental” comes from a method used to create the graphic display. The picture, graph, or chart is developed by moving the pen carriage or paper an incremental distance (step) in response to each individual pulse received at the input connector. These input pulses are processed by circuitry in the plotter, and then applied to a motor.

A “stepper” motor (as it is more commonly called) is unlike other continuously rotating motors, since it requires a specific number of input pulses to rotate the motor shaft 360°. Stepping rates for stepper motors range from 100 to over 5000 steps per second—depending upon the motor design and the drive method used to cause stepping action.

Assume that the x and/or y axes move 0.005 inch for each input pulse. Since pulses may be received in both the x and y axes simultaneously,

the distance of a single diagonal step is increased by the square root of two times the step size [$\sqrt{2} \times 0.005 \text{ inch} = 0.007 \text{ inch}$]. This is the vector sum of two adjacent vectors. Therefore, if a +x and a +y pulse are received simultaneously, the vector sum of the two (+x and +y) will create a 45° angle.

It can be easily shown that by using the eight directions (as illustrated in the first example in Figure B-1), a line at any angle can be approximated more precisely than if only the four axial moves were used. It is the function of the computer software and/or plotter’s intelligence to calculate the optimum sequence of moves for a given line slope.

Figure B-2 illustrates the incremental path generated for a typical analytic function. The magnified portion of Figure B-2 shows that the curve is actually an approximation to the exact slope at any point.

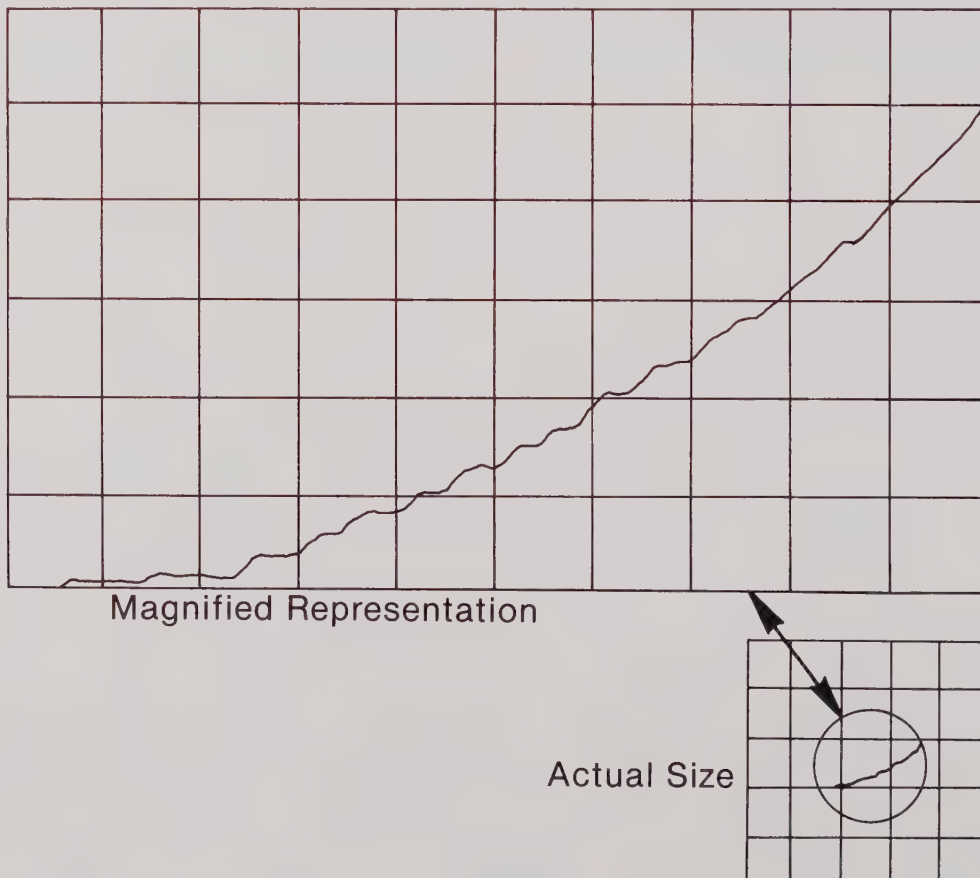


FIGURE B-2
ACTUAL AND MAGNIFIED PLOT INCREMENTS

APPENDIX C

RS-232-C PASS-THROUGH PORT FEATURE

The Pass-Through Port feature enables you to transmit the data received by the Plotter from the host computer to an auxiliary CRT device.

To connect an auxiliary CRT device to the host computer/Plotter configuration, three additional signal wires must be connected from the Plotter's rear RS-232-C connector to the CRT. These signal connections are shown in Table C-1.

The DMP-41/42 plotter models do not have DM/PL Pass-Through Port Enable (X) command capabilities. To disable the pass-through port, disconnect the cable between the plotter and the auxiliary CRT device.

CAUTION

Use only Pins 14, 16, and 7 to connect an auxiliary device to the Plotter. If an auxiliary device is connected to the Plotter and XON/XOFF (Mode One) handshaking is used, make certain that the device connected to the Plotter's Pass-Through Port does not transmit an XON/XOFF handshake while the Plotter is operating. This may cause the host computer to respond to the wrong handshake signal and transmit erroneous plot codes.

TABLE C-1
RS-232-C PASS-THROUGH PORT SIGNAL CONNECTIONS

COMPUTER SIGNAL PIN (DCE)	PLOTTER SIGNAL PIN (DTE)	AUXILIARY (CRT) SIGNAL PIN (DTE)
PIN 2 (RD)	TO PIN 2 (TD)	
PIN 3 (TD)	TO PIN 3 (RD)	
PIN 7 (GRND)	TO PIN 7 (GRND)	TO PIN 7 (GRND)
	PIN 14 (ARD)	TO PIN 2 (ATD)
	PIN 16 (ATD)	TO PIN 3 (ARD)
RD = Receive Data TD = Transmit Data GRND = Common Signal Ground ARD = Auxiliary Receive Data ATD = Auxiliary Transmit Data		

An illustration of this type of connection is shown in Figure C-1.

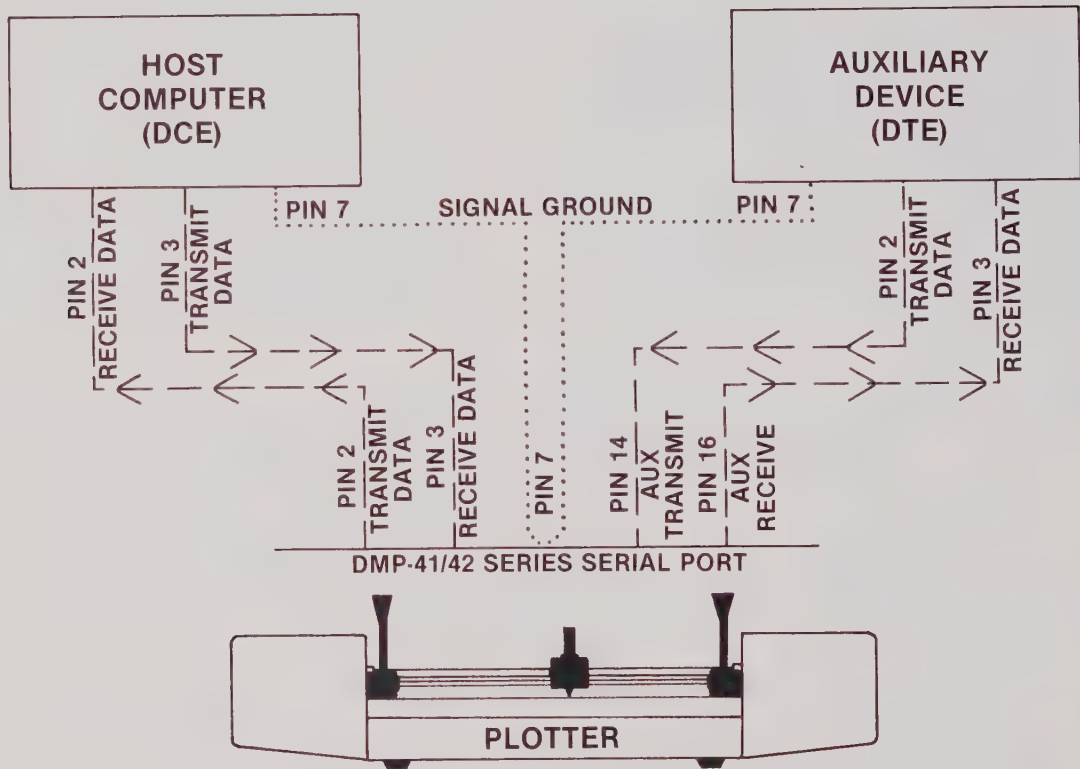


FIGURE C-1
HOST/PLOTTER CRT CONFIGURATION

GLOSSARY

ABSOLUTE VECTOR PAIR: A coordinate set that references a set origin point to determine a position on a plane.

ACCURACY: The plotter's ability to produce a plot exactly to the dimensions specified by an input program or command.

ADDRESSABLE RESOLUTION: A software capability in the plotter that allows a computer to select or change (program) the resolution (step size) of the plotter during remote plotting sessions.

ASCII: Abbreviation for American Standard Code for Information Interchange.

ASYNCHRONOUS SERIAL DATA COMMUNICATIONS: A serial I/O protocol in which each byte transmitted is self-sufficient and does not require a timing sequence.

BAUD RATE: The rate in bits per second at which information is transmitted over a serial link.

BUFFER: A storage circuit that compensates for differences in data flow between two computing devices.

BYTE: A sequence of adjacent binary digits (bits), operated upon as a unit in a computer.

COMMAND STRING: A collection of individual computer or peripheral commands that initiate or control predetermined operations.

COORDINATE SET (x,y): A pair of numeric specifiers that determine a single position on the plane of a coordinate axes system. A coordinate set can determine a position by either referencing a set origin point (absolute) or the position of the last vector pair (relative).

DATA: A general term for the numbers, letters, and symbols that serve as input or output for a computing device.

DIP (SWITCH): Abbreviation for dual in-line package.

DIGITIZER: An electronic device that converts graphic information into digital computer data.

HALF DUPLEX: A communication channel capable of transmission in both directions but in only one direction at a time.

HANDSHAKING: The process of transferring information between two devices in a synchronized manner at a rate acceptable to both devices (this process may be in either hardware or software).

HARDWARE: The electronic circuitry in a system.

HEXADECIMAL: A notation in the scale of 16, using alphanumeric digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, and F.

I/O: Abbreviation for Input and Output data.

IEEE-488 GPIB: Abbreviation for Institute of Electrical and Electronic Engineers #488, General Purpose Interface Bus.

INCREMENT: The smallest possible unit of plotter movement.

INTERFACE: The boundary between two devices.

MODEM PORT: A connector on the plotter for cable interface with a host computer.

POINT MODE: An operating mode of a digitizer where coordinate (x,y) data is digitized one point at a time upon local or remote command.

PROMPT CODE: A signal from a computer to a peripheral that instructs the device to execute the input data.

RAM: Abbreviation for Random Access Memory circuitry.

REPEATABILITY (%): The percent of fluctuation that will occur if the plotter produces the same plot design successively.

RELATIVE VECTOR PAIR: A coordinate set that references the location of the last vector pair to determine the next position on a plane.

ROM: Abbreviation for Read Only Memory circuitry.

TERMINAL PORT: A connector on the plotter for cable interface with a CRT terminal.

NOTES

NOTES

NOTES



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